

Mines and Mineral
Activities 1990

Canada



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Mines and Mineral Activities 1990

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INTRODUCTION

This report covers the activities of the mines and minerals sector of Yukon Territory and the Northwest Territories during the calendar year 1990.

The report was compiled by D.D. Brown of the Mining and Infrastructure Directorate of the Department of Indian Affairs and Northern Development (DIAND), Ottawa. Sections on mineral exploration are based on the 1990 mining exploration overviews produced by DIAND regional staff under the direction of S.R. Morison, Northern Affairs Program in Yukon Region and W.A. Padgham, Northern Affairs Program in the Northwest Territories Region. The glossary of terms appended to the report was written by D. Law-West of the Mining and Infrastructure Directorate, DIAND, Ottawa.

TABLE OF CONTENTS

INTRODUCTION	3
SUMMARY	6
Yukon	6
Northwest Territories	6
SOMMAIRE	7
Yukon	7
Territoires du Nord-Ouest	7
YUKON	8
Mineral Production	8
Mines	8
Canamax Resources Inc., Ketz River Mine	8
Curragh Resources Inc., Faro and Vangorda Mines	11
Seasonal Mine Operations	11
Placer Mining	12
Development	12
Mineral Dispositions	12
Mineral Exploration	13
Exploration Projects	14
Base Metals	14
Precious Metals	16
NORTHWEST TERRITORIES	18
Mineral Production	18
Mines	18
Cominco Ltd., Pine Point Mine	18
Cominco Ltd., Polaris Mine	18
Echo Bay Mines Ltd., Lupin Mine	23
Giant Yellowknife Mines Ltd., Giant Mine	23
Nanisivik Mines Ltd., Nanisivik Mine	24
Nerco Con Mine Ltd., Con Mine	24
Northwest Gold Corp., Colomac Mine	25
Tremanco Resources Ltd., Ptarmigan Mine	25
Development	25
Mineral Dispositions	26
Mineral Exploration	26
Exploration Projects	26
Northern Slave Structural Province	26
Hope Bay Belt	26
Anialik Belt	27
High Lake Belt	27
George Lake - Back River Area	27
Hood River Belt	28
Contwoyto-Itchen-Point Lake Areas	28
Lac de Gras Area	28

Southern Slave Structural Province	28
Russell Lake - Indin Lake Area	28
Indian Mountain Lake Area	28
Yellowknife Supracrustal Basin	29
Cameron - Beaulieu Rivers Belt	29
Yellowknife Turbidite Basin	29
Yellowknife Volcanic Belt	29
Bear Structural Province	30
Great Slave Plain and Cordillera	30
Southeast MacKenzie District	30
District of Keewatin	30
Arctic Islands	31

<u>Appendix</u> Glossary of Terms	35
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Tables

Table 1: Mineral Production of Operating Mines, Yukon, 1988, 1989 and 1990	9
Table 2: Mineral Dispositions Staked and Lapsed, Yukon, 1989 and 1990	13
Table 3: Mineral Dispositions in Good Standing, Yukon, 1989 and 1990	13
Table 4: Exploration Drilling, Yukon, 1990	14
Table 5: Mineral Production of Operating Mines, Northwest Territories, 1988, 1989 and 1990	19
Table 6: Mineral Claims Recorded, Cancelled and in Good Standing, Northwest Territories, 1989 and 1990	26
Table 7: Diamond Drilling, Northwest Territories, 1989 and 1990	26
Table 8: Placer Mining, Mines and Mining Exploration Projects, Yukon, 1990	32
Table 9: Mines and Mining Exploration Projects, Northwest Territories, 1990	33
Table 10: Mineral Production, Yukon, 1981-1990	39
Table 11: Mineral Production, Northwest Territories, 1981-1990	40

Maps

Map 1: Mineral Exploration and Mines, Yukon, 1990	10
Map 2: Mineral Exploration and Mines, Northwest Territories, 1990	20
Map 3: Mineral Exploration and Mines in Slave Structural Province, 1990	22

Figures

Figure1: London Metal Exchange Prices	38
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SUMMARY

Yukon

The value of minerals produced in Yukon was estimated at \$541 million in 1990 compared with \$532 million in 1989. Most of the production was derived from two hardrock mines and 194 seasonal placer gold operations. The largest operation, Curragh Resources' Faro and Vangorda zinc-lead-silver mines, was the leading producer, followed by the 194 Yukon placer gold operations and Canamax Resources' Ketz River gold mine. Production at the Ketz River mine was suspended in September 1990 because of the depletion of economic oxide gold ore reserves.

The most significant development project was the beginning of construction, in September 1990, of a mill and tailings dam at the new Mt. Hundere zinc-lead-silver mine. This new \$70 million project, owned by joint-venture partners Curragh Resources Inc. and Hillsborough Resources Inc., will begin zinc and lead production by the fall of 1991, adding some 100 000 tonnes per year (tpy) of zinc and lead concentrate to Yukon's existing zinc and lead production. Curragh Resources also continued the development of its Vangorda and Grum zinc-lead-silver mines in the Vangorda Plateau area, east of Faro. The Vangorda open-pit mine started producing ore in the fall of 1990 to provide additional feed to the company's Faro mill.

Yukon's mineral exploration expenditures fell to less than \$11 million in 1990 from approximately \$18 million in 1989. The mineral exploration activities were directed to lead-zinc properties (47 per cent), gold and silver properties (45 per cent) and copper, jade and building stone (8 per cent).

Northwest Territories

Mineral production in the Northwest Territories was derived principally from seven producing hardrock mines, including five gold mines (Colomac, Con, Giant, Lupin and Ptarmigan mines) and two base metal mines (Nanisivik and Polaris). The value of mineral production in 1990 was estimated at \$906.4 million compared with \$960.7 million in 1989. Together, zinc and lead production accounted for 72.5 per cent of the total value, while gold accounted for 24.0 per cent.

The drop in the value of mineral production in 1990 compared with 1989 was due in part to a 10 per cent decline in zinc output and a 13 per cent decrease in zinc

prices in 1990 compared with a year earlier. Gold production in 1990 increased by 23 per cent over 1989 because of new output from the Colomac mine and higher gold output from the established Con, Giant and Ptarmigan mines.

The most significant development was the opening, in May 1990, of the \$166 million Colomac gold mine, owned by Northwest Gold Corp. However, by year-end, the mine had encountered a serious cashflow problem because of the shortfall in gold production from anticipated output.

Mineral exploration in the Northwest Territories was expected to drop to \$45 million in 1990, compared with approximately \$55 million in 1989. The number of exploration projects dropped to 92 in 1990 from 127 in 1989. Of the 92 projects, 60 were directed to gold, 21 to base metals and silver, three to uranium and seven to other metals.

SOMMAIRE

Yukon

En 1990, la valeur des minéraux produits au Yukon a été évaluée à 541 millions de dollars comparativement à 532 millions de dollars en 1989. La plus grande partie de la production provenait de deux mines en roche dure et de 194 entreprises d'exploitation saisonnière des placers. La plus grande entreprise, les mines de zinc, de plomb et d'argent de Faro et de Vangorda de la Curragh Resources, venait au premier rang des producteurs, suivie par les 194 entreprises d'exploitation des placers du Yukon et de la mine d'or de la rivière Ketza de la Canamax Resources. En septembre 1990, la production a été interrompue à la mine de la rivière Ketza en raison de l'épuisement des réserves de minerai d'or oxydé.

Le plus important projet fut le début de la construction, en septembre 1990, d'une digue à rejets à la nouvelle mine de zinc, de plomb et d'argent du mont Hundere. Ce nouveau projet, évalué à 70 millions de dollars et appartenant à l'entreprise en participation de la Curragh Resources Inc. et de la Hillsborough Resources Inc., commencera à produire du zinc et du plomb dès l'automne 1991, ajoutant ainsi quelque 100 000 tonnes par an (TPA) de concentrés de zinc et de plomb à la production actuelle du Yukon. La Curragh Resources continue à exploiter ses mines de zinc, de plomb et d'argent à Vangorda et Grum dans la région du Plateau Vangorda, à l'est de Faro. À l'automne de 1990, la mine à ciel ouvert de Vangorda commençait à produire du minerai destiné à alimenter l'usine de la société située à Faro.

La prospection minière du Yukon qui représentait environ 18 millions de dollars en 1989 a baissé à moins de 11 millions de dollars en 1990. Les activités en matière de prospection ont été orientées vers les propriétés de plomb et de zinc (47 p. 100), les propriétés d'or et d'argent (45 p. 100) et le cuivre, le jade et la pierre de construction (8 p. 100).

Territoires du Nord-Ouest

La production minière dans les Territoires du Nord-Ouest provenait principalement des sept mines en roche dure, y compris les cinq mines d'or (Colomac, Con, Giant, Lupin et Ptarmigan) et les deux mines de métaux communs (Nanisivik et Polaris). En 1990, la valeur de la production minière a été évaluée à 906,4 millions de dollars comparativement à 960,7 millions de dollars en 1989. La production de zinc et de plomb représentait 72,5 p. 100 de la valeur totale alors que celle de l'or s'élevait à 24 p. 100.

La chute enregistrée dans la valeur de la production minière en 1990 par rapport à 1989 est attribuable en partie à une baisse de 10 p. 100 de la production du zinc et à une diminution de 13 p. 100 des prix du zinc observée en 1990 par rapport à l'année précédente. La production d'or a accusé une hausse de 23 p. 100 comparativement à 1989 en raison de la production nouvelle de la mine de Colomac et de la production plus élevée constatée dans les mines d'or déjà établies comme Con, Giant et Ptarmigan.

Le projet le plus important est l'ouverture, en mai 1990, de la mine d'or de Colomac, évaluée à 166 millions de dollars et appartenant à la Northwest Gold Corporation. Cependant, à la fin de l'année, les exploitants de la mine ont éprouvé de sérieuses difficultés de trésorerie à la suite de la baisse de la production d'or par rapport à celle escomptée.

Dans les Territoires du Nord-Ouest, la prospection minière devait baisser à 45 millions de dollars en 1990, en comparaison des quelque 55 millions de dollars de l'année précédente. Le nombre de projets de prospection qui était de 127 en 1989 a baissé à 92. Sur les 92 projets, 60 étaient orientés vers l'or, 21 vers les métaux communs et l'argent, 3 vers l'uranium et 7 vers d'autres métaux.

MINES AND MINERAL ACTIVITIES 1990

Yukon

Mineral Production

The value of mineral production in Yukon during 1990 was estimated at \$541 million compared with \$532 million in the previous year. Curragh Resources Inc., with the largest mine operation in Yukon, produced zinc, lead and silver throughout the year from the Faro open-pit mine and from the Vangorda open-pit mine toward year end. Canamax Resources Ltd. suspended operations at its Ketza River gold mine in September 1990 because of the depletion of economic oxide ore reserves. Gold production from Yukon's placer mine operations continued to be second in value only to Curragh Resources zinc-lead-silver output. Placer gold production dropped for the first time in several years to 3 300.9 kg of fine gold or approximately 80 per cent of the output during the previous year.

The highlight of 1990 was the \$70 million development of the Mt. Hundere zinc-lead-silver mine. It is 80 per cent owned by Curragh Resources Inc. and 20 per cent owned by Hillsborough Resources Inc. The companies began construction of a 1 370 tonne per day (tpd) mill and a tailings dam during September 1990. The mine is scheduled to begin production by the fall of 1991.

Among a number of perspective exploration projects, Noranda Exploration Company Ltd. and Loki Gold Corporation defined a large tonnage of heap-leachable gold ore on the Brewery Creek property. However, total exploration activity in Yukon continued to decline significantly in 1990 as measured by expenditures of less than \$11 million compared with approximately \$18 million in 1989 and \$55 million in 1988.

Yukon's hardrock mine operations, comprising Curragh Resources' Faro mine and Canamax Resources' Ketza River mine, employed approximately 733 people directly during the first half of the year. At year end, only Curragh's Faro mine and its new Vangorda mine were operating. Together with development at the new Mt. Hundere mine, the hardrock operations employed 811 persons directly. Yukon's 194 placer mine operations employed an estimated 700 persons during the placer mining season.

Yukon accounted for 13.2 per cent of the zinc, 47.5 per cent of the lead and 2.8 per cent of the gold production in Canada during 1990. Yukon's metallic mineral production in 1990 amounted to 4.2 per cent of the total value of Canadian production compared with 3.8 per cent in 1989.

Mines

Canamax Resources Inc., Ketza River Mine

The company suspended operations at the Ketza River mine (a)* in September 1990 because the economic oxide ore reserves were depleted. The Ketza mill processed 135 939 t of ore grading 9.8 g per t of gold to yield 1 139.9 kg of gold compared with 1 216.1 kg of gold a year previously. The mine was placed on a care and maintenance basis. The company applied to the Yukon Territory Water Board for an amendment to its water licence to allow it to mine and process the gold-bearing sulphide ore reserves that have been defined on the property. Canamax is currently investigating the feasibility of mining the sulphide portion of the Keza deposit.

Type:	underground and open pit
Location:	60 km south of Ross River
Product:	gold
Mill Capacity:	400 tpd
Tonnes Milled:	135 939 t
Oxide Reserves:	16 400 t (December 31, 1990)
Oxide Reserve Grade:	9.7 g/t gold
Employees:	112 (September, 1990)

- * Numbers and letters in parenthesis indicate the location of the property on map 1 entitled Mineral Exploration and Mines, Yukon, 1990.

Table 1:
Mineral Production of Operating Mines, Yukon, 1988, 1989 and 1990

Company, Mine and Commodity	1988		1989		1990(P)	
	t	kg	t	kg	t	kg
Canamax Resources Inc. Ketza River Mine gold		635		1 216		1 140
Curragh Resources Corp. Faro Mine						
zinc	200 927		176 832		151 910	
lead	149 354		108 144		105 510	
silver		214 051		95 428		86 343

Source: Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and will not match Statistics Canada's production figures which are based on metals sold or shipped.

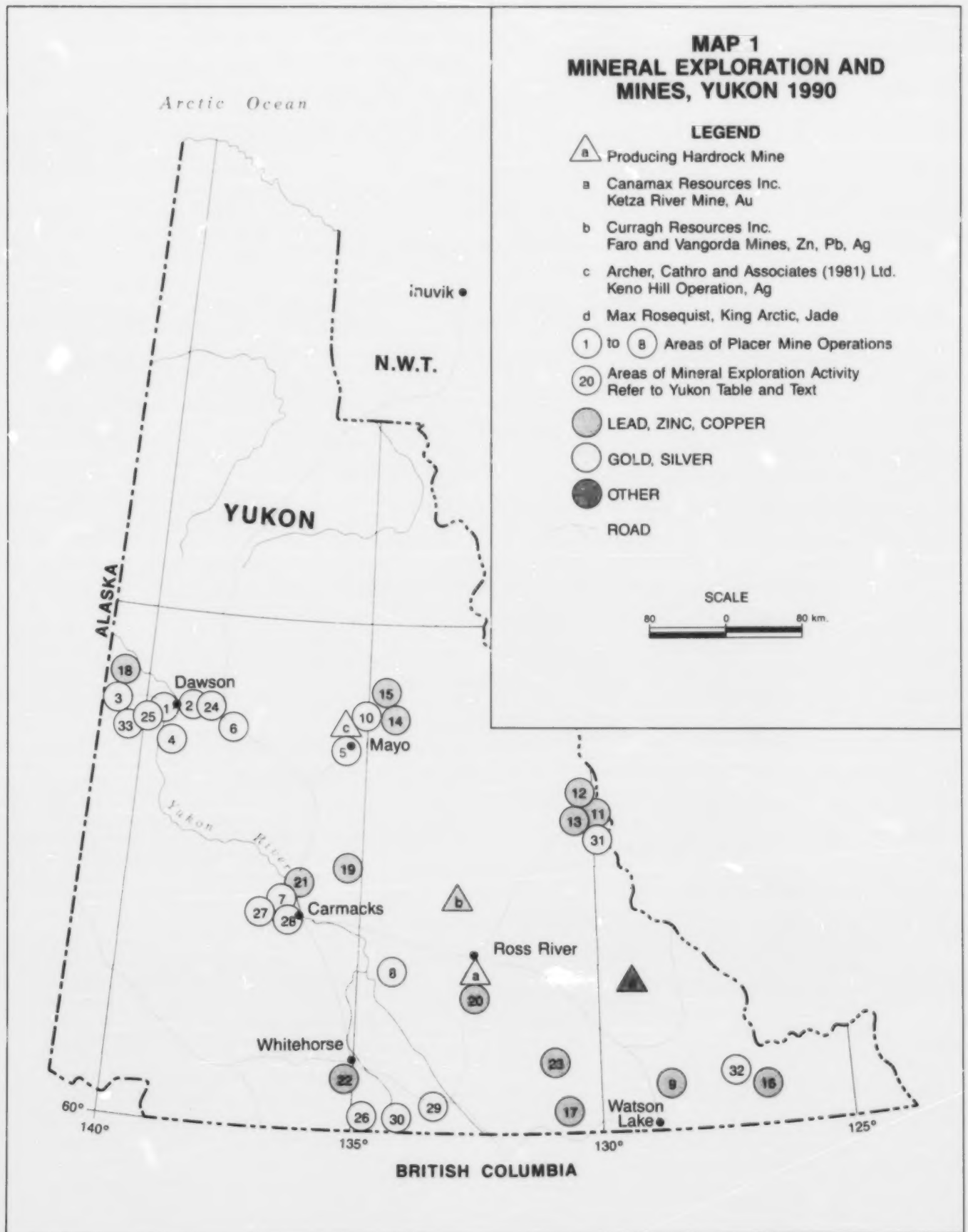
(P) = Preliminary

MAP 1 MINERAL EXPLORATION AND MINES, YUKON 1990

LEGEND

-  Producing Hardrock Mine
 - a Canamax Resources Inc.
Ketza River Mine, Au
 - b Curragh Resources Inc.
Faro and Vangorda Mines, Zn, Pb, Ag
 - c Archer, Cathro and Associates (1981) Ltd.
Keno Hill Operation, Ag
 - d Max Rosequist, King Arctic, Jade
-  1 to 8 Areas of Placer Mine Operations
-  20 Areas of Mineral Exploration Activity
Refer to Yukon Table and Text
-  LEAD, ZINC, COPPER
-  GOLD, SILVER
-  OTHER
-  ROAD

SCALE



Curragh Resources Inc., Faro and Vangorda Mines

The company remains the leading mining operation in Yukon. During 1990, the Faro mill processed 4.7 million t of ore and recovered 359 444 t of zinc concentrate and 189 040 t of lead concentrate. This compares with 316 thousand t of zinc concentrate and 171 thousand t of lead concentrate during the previous year. The 1990 concentrate output contained 151 910 t of zinc, 105 510 t of lead and 86 343 kg of silver. During the year, ore at the Faro mine was extracted from both the Faro open pit and from underground workings near the pit. At year end, the Faro mine (b) together with the Vangorda open-pit mine (b), located 14 km southeast of the Faro mine, were supplying 13 000 tpd of ore to the mill. Surface stripping of overburden at the Vangorda mine was completed during the year.

Curragh is developing three zinc-lead-silver deposits in the Vangorda Plateau area (b) at a cost of \$142 million. In September 1990, Curragh received approval of its water licence to allow mining of the Vangorda and Grum open pits. The company's mine plan schedules the completion of ore production from the Faro underground deposit in September 1991 and the Faro open pit in December 1991, at which time the Faro reserves will be depleted. After 1992, the ore supply will be drawn entirely from the Vangorda and Grum open-pit mines and the DY underground mine, located 14 to 17 km southeast of the Faro mine. The Vangorda open pit will be exhausted by the end of 1992 and the shortfall will be made good from underground mine production in the DY ore deposit. An eight-year life is expected for the Grum open pit and the Grum deposit can be mined from underground in the early years of the next century.

Faro Mine and Vangorda Mine

Types:	open pit and underground
Location:	14 km north of Faro and 7 km east-northeast of Faro
Product:	zinc, lead, silver
Mill Capacity:	13 500 tpd
Tonnes Milled:	4.7 million t
Reserves:	at Faro and Vangorda Plateau Deposits (December 31, 1990)

	Tonnes (in thousands)	Zinc %	Lead %	Silver (g/t)	Gold (g/t)
Faro open pit	4 389	5.01	2.77	25	N/A
Faro underground	632	6.31	4.07	60	0.31
Faro stockpiles	3 078	3.46	2.38	26	N/A
Vangorda open pit	6 296	4.56	3.46	48	0.65
Grum open pit	25 161	5.01	2.96	50	0.81
DY underground	11 300	6.84	5.82	83	0.94
Total	50 856	5.28	3.62	54	N/A
Employees:	621 including contractors (December 31, 1990)				

N/A not available

Seasonal Mine Operations

Archer, Cathro and Associates (1981) Limited mined high-grade silver veins in the Keno Hill area (c) in 1990. The operation consisted of drilling, blasting, bulldozer trenching and hand-picking argentiferous galena and tetrahedrite-bearing ore from the vein material. Average grades shipped were approximately 13 700 g per t of silver on the Lucky Queen vein material and over 6 800 g per t of silver on the Keno #9 vein material. Over 100 t of hand-picked material were shipped during the year.

Max Rosequist continued to mine nephrite jade during the summer months on the KING ARCTIC property (d), near Frances Lake. He produced some 30 to 40 t of jade material from sheared ultramafic rocks for shipment to southern and overseas markets.

Placer Mining

Placer gold production from approximately 194 placer mine operations in 1990 amounted to 4 126.1 kg of crude gold (3 300.9 kg of fine gold) compared with 5 149.8 kg of crude gold (4 119.8 kg of fine gold) from approximately 220 operations in 1989. The 20 per cent drop in production in 1990 from 1989 is attributable to lower average gold prices in the second half of 1990 compared with the same period in 1989. There was a severe erosion in investor confidence because of declining gold prices. Depleting placer reserves and regulatory uncertainty may have also contributed to lower production.

The traditional placer mining areas provided 83.5 per cent of the gold output. These include the Indian River (1), Klondike (2), Sixty Mile and Forty Mile (3) and Lower Stewart River (4) drainage areas. Placer operations in the Mayo area (5), Clear Creek (6), Dawson Range (7) and Livingstone Creek (8) drainage areas provided the remaining production. The value of production was estimated at \$47.4 million in 1990 compared with \$59.7 million in 1989.

Development

In September 1990, joint-venture partners Curragh Resources Inc. and Hillsborough Resources Inc. began construction of a 1 370 tpd mill and a tailings dam to bring the new \$70 million Mt. Hundere zinc-lead-silver mine (9) into production. The mine is located 45 km north of Watson Lake. During the year, the committee administering the federal Environmental Assessment and Review Process (EARP) conditionally approved the mine project.

The mine development is expected to be completed for initial production in September, 1991. The open pit and underground mine operation will feed at least 1 000 tpd of ore to the mill for an output in excess of 100 000 tpy of zinc and lead concentrate. Reserves are estimated at 5 655 000 t of ore grading 12.68 per cent zinc, 4.73 per cent lead and 68.6 g of silver per t in four ore deposits. Over the life of the operation the mine is expected to produce 850 000 t of zinc concentrate averaging 70 per cent zinc and 260 000 t of lead concentrate at an approximate grade of 60 per cent lead.

The mine will employ 140 people over its projected life of eight to ten years. A 27 km haulage road, from the Robert Campbell Highway to the mill site, was being constructed during 1990. The concentrate will be transported by tractor trailer to the port of Skagway, Alaska, and most of the zinc concentrate output will be shipped to a smelter in Spain.

Development work at Mt. Hundere included 1 500 m of in fill diamond drilling, the completion of environmental studies for the EARP review and the collaring of two adit portals on Jewelbox Hill. The Yukon Territory Water Board issued a water licence for the project on January 31, 1991. At year end 1990, the project employed 190 contract personnel.

On the Vangorda Plateau, Curragh Resources Inc. continued its \$142 million development program to bring new zinc-lead-silver reserves into production. Curragh conducted stripping of the overburden material at the VANGORDA and GRUM deposits (b).

Falconbridge Limited's United Keno Hill Mines operation (10) closed in January 1989. Under an agreement with Falconbridge, Bharti Laamanen Mining Inc. was preparing the United Keno Hill operation for renewed production. Despite low silver prices, Bharti Laamanen was planning to start up the Onek open-pit and the Bellekeno underground mine in 1991 by using cost-efficient production methods.

Mineral Dispositions

The number of new quartz (hardrock) claims staked in 1990 exceeded the 1989 figures, but the number of placer claims and placer prospecting leases staked in 1990 decreased from the previous year.

Table 2: Mineral Dispositions Staked and Lapsed, Yukon, 1989 and 1990

	1990	1989
	calendar year	calendar year
	staked (lapsed)	staked (lapsed)
Quartz Claims	6 122	4 641
	(10 380)	(8 339)
Placer Claims	1 503	2 022
	(1 218)	(1 207)
Placer Leases to Prospect	261	277
	(296)	(264)

Source: Department of Indian Affairs and Northern Development

Most new quartz claims staking was by two companies in the Dawson mining district, where they expanded large claim holdings.

Mineral dispositions in good standing at year end 1990 were lower by 2 418 dispositions compared with year end 1989.

Table 3: Mineral Dispositions in Good Standing, Yukon, 1989 and 1990

	1990	1989
	December 31	December 31
Quartz Claims	46 697	49 744
Placer Claims	17 741	17 103
Placer Leases to Prospect	345	351
Iron and Mica Claims	525	525
Coal Leases and Licences	36	36
Dredging Leases	12	15
Total	65 356	67 774

Source: Department of Indian Affairs and Northern Development

The lower number of dispositions in 1990 resulted mainly from the lapsing of a large number of quartz claims.

Mineral Exploration

Yukon experienced a continuing decline in mineral exploration in 1990 with expenditures falling to less than \$11 million compared with approximately \$18 million in 1989 and a record-high \$55 million in 1988.

At least 40 exploration programs were conducted during the year. A few major mining companies conducted advanced exploration, while junior mining companies conducted grassroots exploration on a more limited basis. Base metals and precious metals exploration programs were evenly split with 47 per cent of 1990 exploration focused on lead-zinc-(silver) properties and 45 per cent of exploration centred on gold and silver properties. Exploration for other minerals such as copper, jade and building stone accounted for the remaining 8 per cent of activity.

Exploration Projects

Base Metals

High base metals prices prompted renewed interest in several base metals properties with known tonnage such as the TOM, JASON, MEL and BLENDE zinc-lead-(silver-copper-gold) deposits and the WILLIAMS CREEK copper-gold deposit.

Table 4:
Exploration Drilling in Yukon, 1990

Project	Company	Diamond Drilling		Percussion Drilling	
		Metres	No. of holes	Metres	No. of holes
TOM	Cominco	3 578	7		
NIDD	Cominco	1 352	6		
JASON	Phelps Dodge	2 667	12		
MEL	Barytex	1 552	11		
MARG	NDU/Cameco	4 267	10		
BLENDE	NDU/Billiton	3 657	15		
HYLAND GOLD	NDU/et al			3 800	41
LONESTAR	Abor/et al			3 048	50
BREWERY CREEK	Noranda/Loki	1 290	21	14 838	309
MT HUNDERE	Curragh	1 500	25		
DROMEDARY	Dromedary Exploration	434	2		
JUBE	Dunvegan	263	8		
GODDELL	Skukum/Berglynn	1 250	6		
ROSSBANK	Inco	583	3		
KETZA RIVER	Canamax	2 619	35		
GRAFTER	Aurora Gold			500	4
WILLIAMS CREEK	WCH/Thermal	3	2		
TOTAL		25 015	163	22 186	404

Source: Department of Indian Affairs and Northern Development

In the Macmillan Pass area, northeast of Ross River, Cominco Ltd. under an option agreement with Hudson Bay Mining and Smelting Co. Limited continued its drill program to test the west and southeast zones of the TOM (11) stratiform zinc-lead-silver deposit. A 3 578.7 m diamond drill program was completed. Previously, Hudson Bay Mining and Smelting estimated the reserves of the TOM deposit to be 9 283 700 t grading 7.49 per cent lead, 6.19 per cent zinc and 69.4 g per t of silver using a 7 per cent combined zinc plus lead cut-off grade. Cominco also completed 1 352.3 m of diamond drilling on the NIDD (12) sediment-hosted zinc property, located 20 km northwest of the TOM property. The NIDD property is wholly owned by Cominco.

Also in the Macmillan Pass area, Phelps Dodge Corporation of Canada Ltd. acquired an option to earn 60 per cent interest in the JASON zinc-lead-silver property (13) from Western Canadian Mining Corporation, Ogilvie Mineral Corp. and Abermin Corporation. In 1990, Phelps Dodge completed 12 diamond drill holes totalling 2 667 m to test targets outside the identified mineralized zone of the Jason deposit. The deposit contains geological reserves in three zones amounting to 14.1 million t, grading 7.09 per cent lead, 6.57 per cent zinc and 79.9 g per t of silver using a cut-off grade of 8 per cent combined lead plus zinc.

Some 50 km northeast of Elsa, NDU Resources Inc. and Cameco completed 10 diamond drill holes totalling 4 119 m on the MARG zinc-lead-copper-silver-gold property (14). In November, NDU Resources announced drill-indicated diluted reserves of 2 857 600 t, grading 1.62 per cent copper, 2.25 per cent lead, 4.17 per cent zinc, 55.9 g per t of silver and 0.89 g per t of gold using a minimum mining width of 3 m. Drilling extended the area of mineralization defined by the 38 diamond drill holes, totalling 7 856 m, that were completed during 1988 and 1989. The deposit consists of four tabular massive sulphide lenses plus several smaller lenses in Mississippian phyllite and quartzite. The reserve blocks have an average thickness of 6 m.

The BLENDE property (15), located 5 km north-northwest of the MARG property, was drilled by Billiton Metals Canada Incorporated, under an agreement to earn 50 per cent interest in the property. The property is currently 100 per cent owned by NDU Resources Ltd. The 1990 diamond drill program outlined one lead-zinc-silver mineralized zone, 610 m long. Mineralization occurs in a tabular stockwork and breccia zones cutting Proterozoic dolomite. The mineralization consists of sphalerite,

galena and siderite with traces of quartz, pyrite, chalcopyrite and tetrahedrite.

Preliminary reserves of the BLENDE deposit have been calculated at 11.5 million t grading 2.2 per cent zinc, 3 per cent lead and 50 g per t of silver. The estimates were based on the results from holes drilled in 1990 along a 500 m section of the mineralized fault complex using a minimum open-pit width of 430 m and a cut-off grade of 1 per cent zinc and 1 per cent lead and a stripping ratio of 2.1 to 1 overburden to ore. The only previous drilling of the property consisted of three holes completed in 1989. Billiton is planning additional metallurgical tests, environmental studies and at least 12 000 m of diamond drilling in 1991.

East-northeast of Watson Lake, Barytex Resources Corp. explored the MEL (16) stratabound discordant zinc-lead-barite deposit as part of an option agreement with Breakwater Resources Ltd. The exploration program included drilling and trenching on the MAIN deposit and the newly discovered JERI showing, located 4.5 km east of the MAIN deposit. Eleven diamond drill holes were completed to upgrade the reserves from a drill-indicated to a mineable category. Geological reserves are 5 260 000 t grading 7.86 per cent zinc, 2.09 per cent lead and 48.98 per cent barite. Grade and thickness of the deposit appear to increase with depth.

West of Watson Lake, First Yukon Silver Resources continued trenching on the DAN (formerly BAR) property (17) near Swift River. Trenching exposed sheared and fractured calc-silicate rocks containing massive black sphalerite. The CRESCENT showing, located 3 km northwest of the DAN showing, exhibits similar characteristics in both host rock and mineralization.

In the Forty Mile River area, Archer Cathro and Associates (1981) Ltd., acting on behalf of YGC Resources, began an assessment of the MICKEY (18) showing. Galena and bedded barite occur in limy phyllite on the property. Limited exploration was also conducted by YGC Resources on the BOAR base-metal prospect, near Matson Creek.

Dromedary Exploration Company Ltd. completed two diamond drill holes on the DROMEDARY MOUNTAIN property (19). One of the holes intersected 43 m of massive pyrite and pyrrhotite containing traces of galena and sphalerite.

Yukon Minerals Corporation conducted trenching and sampling on the KETZA (20) project on Groundhog Creek, south of Ross River. The exploration program successfully expanded known mineralized zones and led to the discovery of the OTTER zone, which comprises stratiform mineralization explored over a strike length of 200 m. Assay returns included 7.5 per cent zinc, 2.7 per cent lead and 18 g per t of silver over a width of 2 m.

Thermal Exploration and Western Copper Holdings, an affiliate of Teck Corporation, acquired an option on the WILLIAMS CREEK copper property (21) in 1989, from its owner, Archer Cathro and Associates (1981) Ltd. The deposit is located west of Carmacks and has reserves of 16.3 million t grading 1.15 per cent copper and 0.68 g per t of gold, using a cut-off grade of 0.6 per cent copper. The deposit comprises both oxidized and sulphide reserves. In the fall of 1990, three diamond drill holes were completed to test a zone containing higher grade gold within the copper deposit. The oxide ore could be mined by open-pit methods. A solvent extraction - electrowinning plant capable of producing 30 t per day of copper would be used if the property is developed for production.

Aurora Gold Ltd. drilled four reverse-circulation rotary drill holes in the Whitehorse Copper Belt, south of the GRAFTER deposit (22). One hole intersected two zones of copper mineralization, with a 30 m intersection averaging 1.49 per cent copper, 0.377 g per t of gold and 6.17 g per t of silver. A 17 m intersection averaged 1.93 per cent copper, 0.54 g per t of gold and 14.1 g per t of silver.

Placer Dome Inc. conducted an airborne geophysical survey over its FYRE LAKE copper-zinc-silver property (23), located northwest of Watson Lake.

Precious Metals

Approximately one half of the 1990 exploration activity was directed to gold and silver properties.

On the BREWERY CREEK property (24), east of Dawson, Loki Gold Corporation and Noranda Exploration Company Limited trenched and drilled approximately 200 holes during 1990 to test the strike and down-dip extensions of several mineralized zones and to explore previously untested targets outlined by geochemical sampling. In February 1981, Noranda estimated the total preliminary reserves of the

BREWERY CREEK deposit at 10.07 million t grading 1.79 g per t of gold. The preliminary oxide reserve is the most significant, amounting to 7.44 million t at a grade of 1.89 g per t of gold. Preliminary tests of the oxidized material using cyanide leaching have given excellent recoveries for either heap leaching or conventional mill processing of the ore.

In the Dawson area, Arbor Resources Inc. explored the LONESTAR property (25). The company completed 3 000 m of percussion drilling in 50 holes to test seven gold targets within the 3 000 claim property. The targets included IP (induced polarization), magnetometer and geochemical anomalies.

In the Wheaton area, Skukum Creek Inc. and Berglynn Resources Inc. explored the GOLDEN TUSK zone of the GODDELL property (26). The GOLDEN TUSK zone is a hydrothermally altered shear zone intruded by felsic and intermediate dikes, which cut Cretaceous quartz monzonite. Six diamond drill holes tested the extension of the GODDELL discovery and numerous intersections yielded gold assays.

Doron Explorations Inc. constructed a mill to process a bulk sample mined from an exposed gold-bearing vein on the Caribou Creek property (27), located northeast of Carmacks on Mt. Freegold. The vein was stripped over a length of 1 300 m.

Aurchem Exploration continued exploration on the GOULTER property (28), located west of Carmacks, adjacent to the MT. NANSEN property of BYG Natural Resources Inc. The GOULTER property includes the Willow Creek and Eliza zones. Exploration in 1990 concentrated on the Eliza zone, where a geophysical survey traced the steeply dipping shear zone over a distance of 1 km. The zone exceeds 150 m in width and contains quartz vein material.

Dunvegan Exploration Ltd. conducted diamond drilling, trenching and metallurgical test work on the TOG property (29), located northeast of Carcross. Gold-bearing quartz veins and quartz-carbonate alteration occur in faults, and mineralization consists of gold associated with malachite, azurite, pyrite, galena and sphalerite.

Feather Gold Resources Ltd. conducted an extensive bulldozer trenching program on seven veins on the PEERLESS property (30), on Montana Mountain, near Carcross.

Noranda Exploration Company Limited conducted grassroots exploration on the ITSI and PUTZ-BENNETT properties (31), near Macmillan Pass. The target is gold-bearing quartz veins, which form ladder structures in dikes along the margins of Cretaceous intrusions.

NDU Resources Ltd., Silverquest Resources Ltd. and Adrian Resources Ltd., as principals in the Hyland Gold Joint Venture, explored the HYLAND GOLD (QUARTZ LAKE) property (32), northeast of Watson Lake. Bulldozer trenching and more than 3 800 m of rotary drilling were completed in more than 41 holes. The 1990 program tested a 2.5 km-long gold-arsenic-bismuth soil geochemical anomaly. The drilling confirmed that gold occurs at the contact between quartzite and phyllite in relatively flat-lying jasperoid and altered and brecciated quartzite in the Proterozoic Hyland Group. Gold is associated with quartz carbonate veins, graphitic shears and quartz-limonite breccias within steep north-trending fault zones.

Southwest of Dawson, Tombstone Explorations Ltd. conducted bulldozer trenching, chip sampling and soil sampling on the CONNAUGHT (33) copper-gold skarn deposit. Geochemical surveys, geochemical mapping and sample assaying were conducted on the LORRIE property (33), in the Tombstone Mountains, southwest of Dawson.

MINES AND MINERAL ACTIVITIES 1990

Northwest Territories

Mineral Production

In 1990, mineral production in the Northwest Territories (N.W.T.) was derived principally from seven producing hardrock mines, including five gold mines and two base-metal mines. The value of mineral production was estimated at \$906.4 million in 1990 compared with \$960.7 million a year earlier. Zinc production fell by 10 per cent in 1990 compared with a year earlier, principally because shipments from Pine Point Mine's stockpile were lower than during the previous year. In addition, zinc prices dropped approximately 13 per cent from 1989 to 1990. Gold production in 1990 increased by 23 per cent compared with a year earlier, because of new production from Northwest Gold Corp.'s Colomac mine and higher gold output from NERCO's Con mine, Giant Yellowknife's Giant mine and Treminco's Ptarmigan mine. The average gold price in 1990 was only slightly lower than in 1989.

Together, lead and zinc accounted for 72.5 per cent of the total value of N.W.T.'s mineral production, while gold accounted for 24.0 per cent.

The new 10 000 tpd Colomac gold mine began production in May 1990 as the largest ore producer in the N.W.T. By the end of 1990, it became increasingly evident that this large-tonnage, low-grade mine was failing to meet anticipated levels of gold production, and the fate of the mine depended on new financing to provide for the shortfall in working capital.

Exploration in the N.W.T. continued to decline from previous levels, and expenditures were expected to drop to \$45 million in 1990 compared with approximately \$55 million in the previous year. The decline is attributed to the replacement of the Flow-Through Share Income Tax Program by the Canadian Exploration Incentives Program, as vehicles for exploration financing. Downward trending gold prices, higher interest rates and uncertainty related to the northern comprehensive native land claims were also cited as factors.

The mineral industry in the N.W.T. accounted for 24.7 per cent of the zinc, 17.0 per cent of the lead and 9.1 per cent of the gold produced in Canada during 1990. The value of these metals combined with by-product silver, bismuth and cadmium accounted for 6.9 per cent of Canada's metallic mineral production, compared with 6.7 per cent in 1989.

The seven operating mines in the N.W.T. directly employed 1 950 persons during 1990 compared with 1 692 in 1989.

Mines

Cominco Ltd., Pine Point Mine

In 1990 Cominco Ltd. surrendered its 50.1 per cent equity interest in Pine Point Mines Limited. As part of the same transaction Cominco acquired a 100 per cent interest in the remaining operations at Pine Point.

Pine Point closed its zinc-lead mine (f) at Pine Point in 1987. During 1990, the company continued to ship concentrate to markets from its stockpiles at Pine Point. In April, 1990 much of the lead and zinc stockpiles had been delivered to smelters and the Pine Point mill was re-started to re-recover concentrate mixed with the sand and gravel-base pads of the stockpile. The company completed shipment of zinc concentrate in September 1990, but shipments of lead concentrate were expected to continue to into 1991.

Cominco Ltd., Polaris Mine

Cominco Ltd. owns 77.5 per cent of the Polaris zinc-lead mine (b)* on Little Cornwallis Island and Pine Point Mines Limited owns 22.5 per cent. Polaris set new records for both tonnage milled and zinc concentrate produced in 1990. The mill processed 1 017 200 t of ore to produce 227 100 t of zinc concentrate grading 62.7 per cent zinc and 48 200 t of lead concentrate grading 78.2 per cent lead. Eleven shipments of lead and zinc concentrate were made to Europe between August 1 and October 25, 1990, for a record total of 285 300 t shipped. Capital expenditures for 1990 included \$2.7 million for replacement of equipment and the completion of the Keel Zone haulage system.

Table 5:
Mineral Production of Operating Mines, Northwest Territories, 1988, 1989 and 1990

Company, Mine and Commodity	1988		1989		1990(P)	
	t	kg	t	kg	t	kg
Cominco Ltd. Polaris Mine zinc	134 800		139 190		142 392	
lead	34 200		32 060		37 692	
Echo Bay Mines Ltd. Lupin Mine gold	6 297		6 082		6 072	
Giant Yellowknife Mines Ltd. Giant Mine gold	2 224		3 270		3 647	
Nanisivik Mines Ltd. Nanisivik Mine zinc	63 100		57 328		56 200	
lead	1 000		2 448		1 400	
silver	22 200		16 956		18 100	
NERCO Con Mine Ltd. Con Mine gold	2 551		2 992		3 643	
silver	510		621			
Northwest Gold Corp. Colomac Mine gold					2 130	
Treminco Resources Ltd. Ptarmigan Mine gold	416		478		585	

Source: Department of Indian Affairs and Northern Development. These figures are those reported by the mines as production and will not match Statistics Canada's production figures which are based on metals sold or shipped.

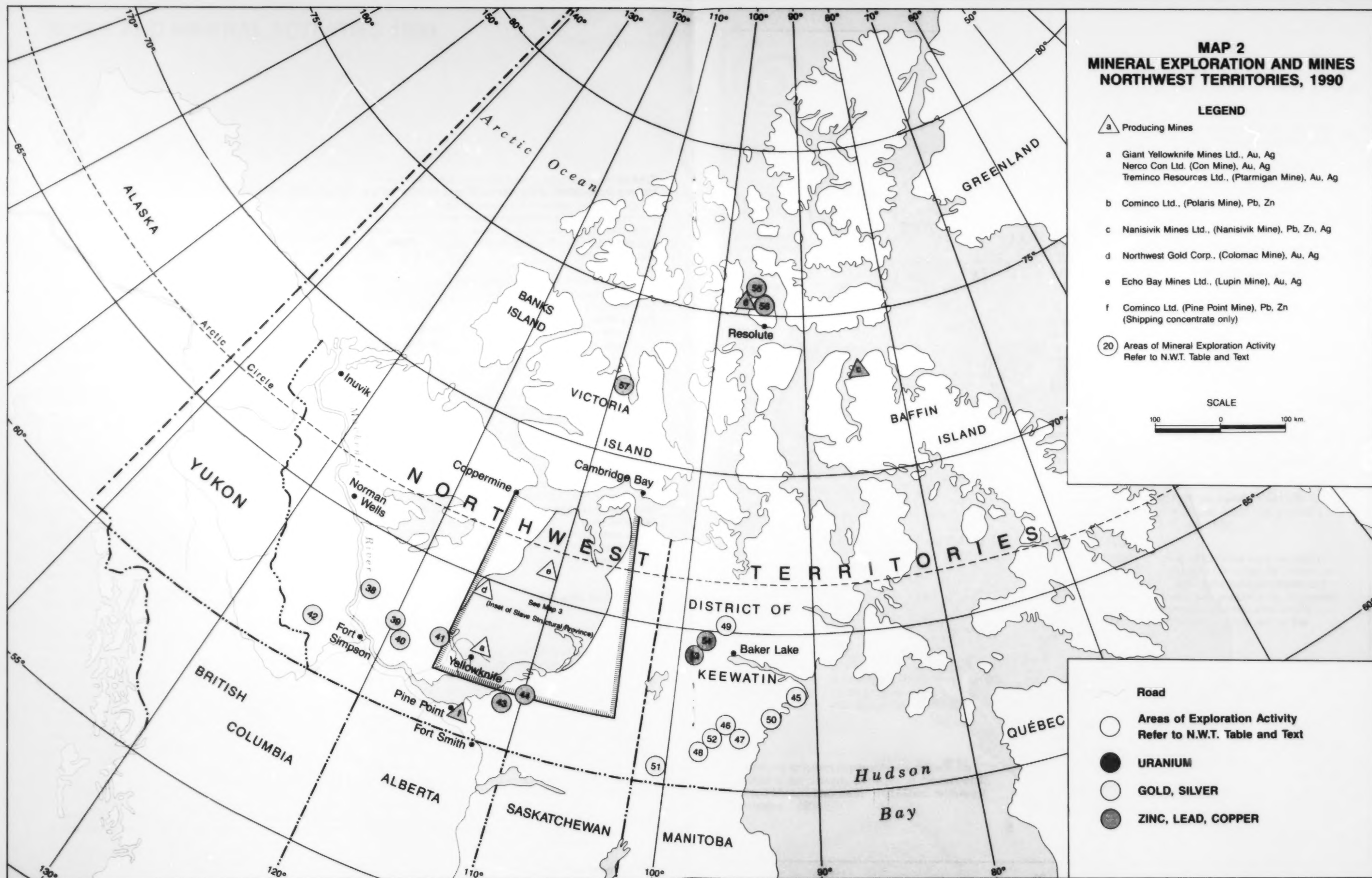
(P) = Preliminary

MAP 2 **MINERAL EXPLORATION AND MINES** **NORTHWEST TERRITORIES, 1990**

LEGEND

- △ Producing Mines**
- a Giant Yellowknife Mines Ltd., Au, Ag
 Nerco Con Ltd. (Con Mine), Au, Ag
 Tremco Resources Ltd., (Ptarmigan Mine), Au, Ag
 - b Cominco Ltd., (Polaris Mine), Pb, Zn
 - c Nanisivik Mines Ltd., (Nanisivik Mine), Pb, Zn, Ag
 - d Northwest Gold Corp., (Colomac Mine), Au, Ag
 - e Echo Bay Mines Ltd., (Lupin Mine), Au, Ag
 - f Cominco Ltd. (Pine Point Mine), Pb, Zn
 (Shipping concentrate only)
- 20 Areas of Mineral Exploration Activity**
 Refer to N.W.T. Table and Text

SCALE



Road

- Areas of Exploration Activity**
 Refer to N.W.T. Table and Text
- URANIUM**
- GOLD, SILVER**
- ZINC, LEAD, COPPER**

MAP 3
MINERAL EXPLORATION AND MINES
IN SLAVE STRUCTURAL PROVINCE, 1990

LEGEND

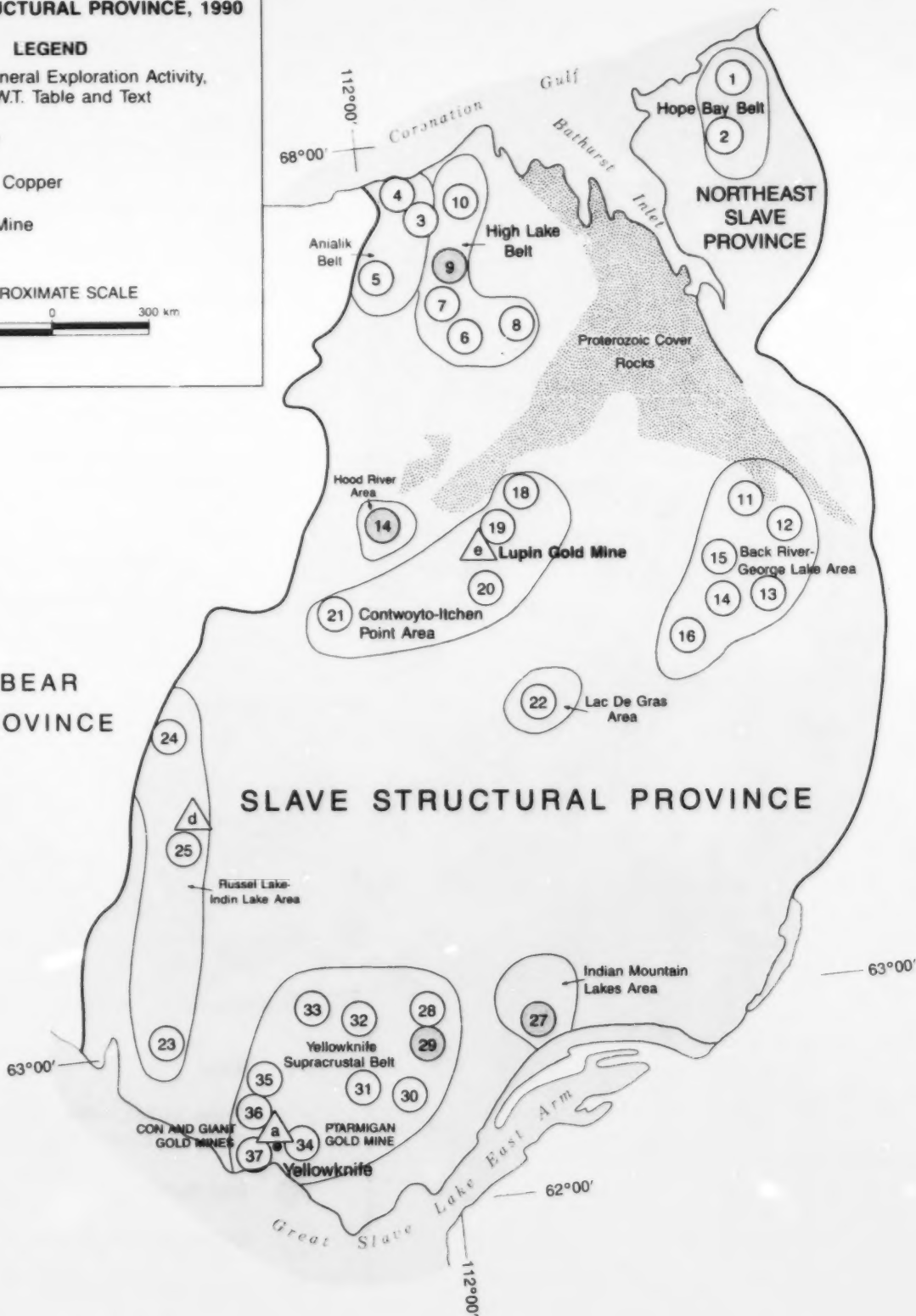
- (20) Areas of Mineral Exploration Activity,
Refer to N.W.T. Table and Text
- Gold, Silver
- Zinc, Lead, Copper
- △ 34 Producing Mine

APPROXIMATE SCALE
300 0 300 km

BEAR
PROVINCE

SLAVE STRUCTURAL PROVINCE

NORTHEAST
SLAVE
PROVINCE



Type:	underground
Location:	Little Cornwallis Island (120 km northwest of Resolute)
Mill Capacity:	3 100 tpd
Tonnes Milled:	1 017 200 t
Reserves:	11.793 million t (December 31, 1990)
Reserve Grade:	14.1 per cent zinc, 3.8 per cent lead
Employees:	274 (December 31, 1990)

Echo Bay Mines Ltd., Lupin Mine

The Lupin gold mine (e) is located 90 km south of the Arctic Circle and approximately 400 km northeast of Yellowknife. In 1990, the Lupin mill processed 1 726 t of ore per day for a total of 629 000 t with an average grade of 10.29 g of gold per t. This compares with 1 717 t of ore per day for a total of 625 000 t with an average grade of 10.35 g of gold per t in 1989. The 1990 gold production amounted to 6 072.4 kg compared with 6 082.4 kg a year earlier. During 1990 the mine shaft was deepened to about 4 000 feet (1 219 m) from its previous depth of 3 120 feet (951 m). The spiral underground ramp was deepened to about 3 080 feet (939 m) from 2 460 feet (750 m). At year end 1990, the company had about nine years of reserves at current production rates, with no indication that the Lupin ore body is bottoming out at depth.

Type:	underground
Location:	400 km northeast of Yellowknife
Product:	gold
Mill Capacity:	1 600 - 2 000 tpd
Tonnes Milled:	629 000 t
Reserves:	4.04 million t (December 31, 1990)
Reserve Grade:	10.66 g/t gold
Employees:	413 (December 31, 1990)

* Numbers or letters in parenthesis indicate the location of the property on map 2, in the centrefold, entitled Mineral Exploration and Mines, Northwest Territories, 1990.

Giant Yellowknife Mines Ltd., Giant Mine

In November 1990, Royal Oak Resources Limited purchased control of the Pamour Group of companies, which includes Giant Yellowknife Mines, giving Royal Oak a 41.7 per cent equity interest in Giant Yellowknife Mines Ltd. at a cost of \$33 million. Royal Oak also acquired a direct 16.6 per cent interest in Giant Yellowknife Mines.

In June 1990, mining of the A-1 and B-1 open-pit mines was completed at the Giant mine (a). Future production will come entirely from the underground operation. During the year, the Giant mill processed 347 079 t of ore at an average grade of 9.942 g per t of gold. This compares with 357 417 t of ore grading 8.325 g per t of gold in 1989.

In 1990, the tailings retreatment plant processed 694 156 t of tailings at 2.408 g per t of gold and recovery of 28.2 per cent compared with 992 644 t of tailings grading 2.08 g per t of gold and recovery of 28.6 per cent in 1989. In October, the plant was closed because of the onset of cold weather.

Total bullion recovered from the conventional milling and tailings retreatment amounted to 3 646 976 g in 1990 compared with 3 270 406 g in 1989.

In January 1990, 29 mine employees were laid off as the company took measures to cut costs. In December 1990, when Royal Oak closed the tailings retreatment plant indefinitely because it was uneconomic, 28 people were laid off. The workforce was reduced to 335 employees compared to approximately 400 at the beginning of the year.

Type:	underground and openpit
Location:	2.4 km north of Yellowknife
Product:	gold
Mill Capacity:	1 000 t pd
Tonnes Milled:	382 591 t
Reserves:	2.99 million t
Reserve Grade:	10.18 g/t gold

Tailings Retreatment Plant

Capacity:	9 070 tpd
Tonnes Processed:	694 156 t
Reserves:	Nil
Employees:	335 (December 31, 1990)

Nanisivik Mines Ltd., Nanisivik Mine

Nanisivik Mines Ltd. is wholly owned by Conwest Exploration Company Limited. In June, 1990 Conwest Exploration Company Ltd. amalgamated with its 51 per cent owned subsidiary Mineral Resources International Limited.

In 1990, production at the Nanisivik mine (c) amounted to 716 400 t of ore grading 8.1 per cent zinc, 0.4 per cent lead and 35 g per t of silver compared with 706 000 t of ore grading 8.4 per cent zinc, 0.4 per cent lead and 32 g per t of silver in 1989. Approximately 45 per cent of the mill feed came from the Main Zone and the remainder from satellite deposits. The mill output was 100 700 t of zinc concentrate and 2 600 t of lead concentrate containing 56 200 t of zinc, 1 400 t of lead and 18 100 kg of silver. Shipments, principally to European smelters, totalled 102 700 t of zinc concentrate and 3 000 t of lead concentrate.

Approximately 25 per cent of the employees at the Nanisivik mine are drawn from the Inuit population of the Northwest Territories. Twenty per cent of employees at the mine are women.

Type:	underground
Location:	27 km east of Arctic Bay, Baffin Island
Product:	zinc, lead, silver
Mill Capacity:	2 000 tpd
Tonnes Milled:	716 400 t
Reserves:	2 618 000 t (December 31, 1990)
Reserve Grade:	8.5 per cent zinc, lead N/A, silver N/A
Employees:	216 (November 30, 1990)

N/A = not available

NERCO Con Mine Ltd., Con Mine

NERCO Con Mine Ltd. is a unit of NERCO Minerals Company and both are wholly owned by NERCO Inc.

From the time of acquisition of the Con gold mine (a) in late 1986 to year end 1989, NERCO Con Mines Ltd. invested approximately US \$50 million to modernize and expand the mining and milling rates of the Con mine. Since 1987, the cash production costs at the mine have been reduced 25 per cent, largely by mechanization of mining. Mill capacity has been increased by more than 25 per cent to reach 1 000 tpd in early 1991.

In 1990 a 50-year production record was attained. The mine produced 3 642.7 kg of gold from 285 960 t of ore milled, compared with 2 922 kg of gold from 243 620 t of ore milled in 1989. Underground ore production was from the 3 900, 4 100, 4 500 and 5 500-foot levels accessed from the Robertson shaft. Development work was conducted on the 5 700 and 5 900-foot levels. In June, NERCO also began using the rehabilitated C1 shaft to hoist ore from the 2 300 and 2 900-foot levels. The 2 600 foot level was also rehabilitated for production.

By year end, the Campbell shear, the largest host structure for ore zones, had been explored by approximately 54 900 m of underground drilling. The exploration and development work increased ore reserves significantly.

Early in 1991, a public hearing was held in Yellowknife to review the proposed \$19.4 million autoclave pressure oxidation circuit that will be added to the existing mill by late 1992 to produce additional gold from the refractory arsenopyrite-bearing ore. The project is expected to create 21 new jobs.

Type:	underground
Location:	1.4 km south of Yellowknife
Product:	gold, silver
Mill Capacity:	1 000 tpd
Tonnes Milled:	285 960 t
Reserves:	3.11 million t (December 31, 1990)
Reserve Grade:	10.32 g/t gold
Employees:	371 (December 31, 1990)

Northwest Gold Corp., Colomac Mine

Northwest Gold Corp., the owner and operator of the Colomac gold mine (d), is 52 per cent owned by Northgate Exploration Ltd. In May 1990, ABM Gold Corp. was renamed Northwest Gold Corp. to identify the company more closely with its mine operation in the N.W.T. Construction of the mine facilities, including a 10 000 tpd mill, was completed in March 1990, one year after construction began. Total cost of the facility was \$166 million. Pre-stripping and mining of the Zone 2 open pit began in August, 1990.

Milling of ore at the Colomac mine began in May 1990, and the first gold bar was poured on May 29, 1990. By mid-1990, the mine was producing 35 000 tpd of ore and waste compared with a full planned capacity of 40 000 tpd. The mill processed an average of 5 216 tpd compared with its 10 000 tpd nameplate capacity. By year end 1990, 2 129.97 kg of gold were produced from ore containing an average of 1.89 g per t of gold.

In November 1990, Northwest Gold Corp. wrote down the \$151.7 million carrying value of the Colomac mine, because of the lower-than-expected gold production realized since startup in May, low gold prices and the mine's ongoing financial requirements. In December 1990, layoff notices were sent to 50 employees at the mine. At year end, the company was rescheduling \$7.5 million in debt repayments. In February 1991, the future of the mine appeared precarious because of the financial restructuring needed to continue the operation.

Type:	open-pit
Location:	219 km north-northwest of Yellowknife
Product:	gold
Mill Capacity:	10 000 tpd
Tonnes Milled:	N/A
Reserves:	N/A
Reserve Grade:	N/A
Employees:	279 (December 31, 1990)

N/A: Not available

Tremingo Resources Ltd., Ptarmigan Mine

The company mined ore on the 450 and 750 foot levels of the Ptarmigan mine (a) and broken ore was hoisted from the 150 and 350 foot levels. The company reached the 180 tpd nameplate capacity of the Ptarmigan mill during the second half of 1990. Production during the fiscal year ending July 31, 1990 amounted to 558.46 kg of gold from 56 996 t of ore processed. In the first half of the company's 1991 fiscal year ending December 31, 1991 production amounted to 263.23 kg of gold from 25 129 t of ore processed.

Tremingo Resources explored the area between the Ptarmigan mine and its nearby Tom mine, located 1.6 km from the Ptarmigan mine, by completing approximately 2 440 m of drilling. A sizeable gold-bearing zone was delineated in the "C" vein located 300 m south of the Tom mine and 1 200 m north of the Ptarmigan vein. At the Tom mine, a 335 m long decline to the "C" vein was completed in December 1990 and the vein is being developed for production in 1991.

Tremingo Resources, under an option agreement with Giant Yellowknife Mines Ltd. plans to test mine the Crestaurium gold property, located near Yellowknife. Open-pit material from Crestaurium property will be used to supplement production from the Ptarmigan and Tom mines, if feasible.

Type:	underground
Location:	20 km east of Yellowknife
Mill Capacity:	180 tpd
Tonnes Milled:	56 996 t (fiscal year 1990 ended July 31, 1990)
Reserves:	146 963 t (July 31, 1990)
Reserve Grade:	11.013 g/t gold
Employees:	40 (December 31, 1990)

Development

Following 14 months of construction and mine development, Northwest Gold Corp. brought its Colomac gold property (d) into production in May 1990. The operation is described in the preceding section under the caption "Northwest Gold Corp., Colomac Mine".

In early July 1990, Urangesellschaft Canada Ltd. announced that it had asked the Federal Environmental Assessment Review Office (FEARO) to delay indefinitely the ongoing environmental assessment review public hearings on the company's proposed development of its Kiggavik uranium mine project on the LONEGULL claim block (54), located west of Baker Lake.

Mineral Dispositions

In 1990, the number of claims recorded and claims in good standing in the N.W.T. declined by 22 per cent and 5 per cent respectively from the previous year.

Table 6:
Mineral Claims Recorded, Cancelled and in Good Standing, Northwest Territories, 1989 and 1990

	1990 calendar year	1989 calendar year
Claims recorded (hectares)	441 (355 346)	712 (456 987)
Claims cancelled (hectares)	1 037 (563 548)	249 (419 353)
Claims in good standing (hectares)	15 348 (2 947 349)	15 945 (3 155 551)

Source: Department of Indian Affairs and Northern Development

Mineral Exploration

Mineral Exploration expenditures in the N.W.T. in 1990 were expected to drop to approximately \$40 million compared with expenditures of approximately \$55.5 million in 1989. The decline was attributed to the replacement of the Flow-Through Share Program by the Canadian Exploration Incentive Program, as tax-shelter programs to support mineral exploration investment. In addition, a downward trend in gold prices, uncertainty

related to the northern comprehensive land claims and higher interest rates were cited.

The number of exploration projects dropped to 92 from 127 in 1989 and 157 in 1988. Of the 92 projects in 1990, 60 were directed to gold exploration, 21 to base metals and silver, 3 to uranium and 7 to other metals.

Table 7:
Diamond Drilling, Northwest Territories, 1989 and 1990

	1990 calendar year	1989 calendar year
	metres (m)	
Surface Drilling	113 933	79 763
Underground Drilling	74 745	81 158
Total Drilling	188 678	160 921

Source: Department of Indian Affairs and Northern Development

Exploration Projects

Northern Slave Structural Province

Hope Lake Belt

In the Hope Bay Belt, Noranda Exploration Company Ltd. drilled the Wombat (Granite) showing on the CAPE-DOK-LARK claim group (1), under an option agreement with Abermin Corporation. Channel sample results include 18.23 g per t of gold over 3.5 m and 13.42 g per t of gold over 5.6 m.

Also in the Hope Bay Lake area, BHP-Utah Mines Ltd. conducted reconnaissance exploration. The company staked the KAMIK claims (2).

Anialik River Belt

In the east central Anialik River volcanic belt, south of Coronation Gulf, Covello, Bryan and Associates completed nine drill holes at five widespread sites on the TAM, TELLY, JOY and ANIALIK claims (3) for a total of 606 m. One hole totalling 81 m was completed on the CHAR group (4), where additional claims were staked. All work was conducted on behalf of Continental Pacific Resources Ltd.

In the south Anialik Belt, BHP-Utah Mines Ltd. conducted reconnaissance mapping and prospecting on Prospecting Permit 1181 (5), which includes the company's ARNICA claim group.

High Lake Belt

In the southern part of the High Lake volcanic belt (6), BHP-Utah Mines Ltd. conducted an extensive program, including the completion of 100 drill holes on the ULU claims. Additional work included a small drill program on the PULSE claims and geophysical surveys on the DEN and FIDO claim groups, optioned from Aber Resources Ltd. On FIDO 3, five drill holes totalling 174 m were completed. The company staked the BAMAKO and PARIS claims in the central part of the High Lake belt (7) and conducted grassroots exploration on the HOTEL claims, in the east arm of the belt (8).

BHP-Utah Mines Ltd. prospected and mapped the ROMA claim group (9), located east of the High Lake base metal property and completed a geophysical survey and geological mapping on the CYGNET claims (10), at the north extremity of High Lake.

In the northern part of the High Lake Belt, Covello, Bryan and Associates mapped the High Lake property (9), which contains the High Lake volcanogenic copper-zinc-lead-silver deposit. The work was conducted for Kennco Explorations (Canada) Limited, the owner of the property. Covello, Bryan and Associates, on behalf of Continental Pacific Resources Ltd., completed three drill holes totalling 232 m on the MONA claims and one drill hole totalling 63 m on the CHARLIE claims (9). Continental Pacific resources also staked the nearby JON and KATH claims.

On the KLC property (9), south of High Lake, Cominco Ltd. drilled two holes to test a geophysical conductor. The conductor proved to be caused by graphite.

George Lake - Back River Area

Gold-bearing iron formation is the principal exploration target in this area. In the George Lake Belt, Trigg Woollett Olson Consulting Ltd. managed a major exploration program on the BRAU claims (1), on behalf of the George Lake Joint Venture, comprising Homestake Mining Company Ltd. and Kerr-McGee Corporation. Work included magnetometer and VLF-EM geophysical surveys, geological mapping and completion of 159 drill holes totalling 28 000 m. This program has been going on since 1985.

Adjacent to the BRAU claims (11), Echo Bay Mines Ltd. conducted reconnaissance mapping and prospecting on the RAP-WR-IPG-PEW-SEL-LOW claim group, that was optioned from Aber Resources Ltd. In the same area, Cogema Canada Ltd. explored for vein-type gold deposits on the DEX claims.

At Boot Lake (12), Trigg, Woollett Olson Consulting Ltd. mapped and completed ground geophysical surveys on another group of BRAU claims. At Needle Lake (13), the company drilled 13 holes totalling 1 300 m on a third group of BRAU claims. Work at Needle Lake, Boot Lake and other smaller projects in the area was conducted on behalf of the Back River Joint Venture, consisting of Homestake Mining Company, Kerr-McGee Corporation and the MacLab Group.

In the Reagan Lake supracrustal belt, BHP-Utah Mines Ltd. completed geological mapping and ground VLF-EM and magnetometer geophysical surveys over parts of the RAJAH and PRIMERO claims (14). In the same area, Cogema Canada Ltd. conducted a mapping and sampling program on the GAET claim group (15).

In the Esker Lake area, Equity Silver Mines Limited conducted exploration on the MUSKOX-WASP-UP claim group (16), under terms of a joint venture agreement with Argus Resources Ltd. and Sirius Energy Corporation Ltd.

Hood River Belt

On the HOOD claims (17), south of Takijug Lake, in the Hood River volcanic belt, Falconbridge Limited resampled core from its Hood River #10 volcanogenic copper-zinc-silver deposit and conducted lithogeochemical sampling on the property.

Contwoyto - Itchen - Point Lakes Area

Exploration in this area was for iron-formation hosted gold deposits (Lupin type). Joint-venture partners, Cominco Ltd., the operator, and Cogema Canada Ltd., explored the COCO claims (18) by mapping, prospecting and conducting 100 line km of magnetometer and HL-EM geophysical surveys. Fifteen holes totalling 1 200 m were drilled. Thin intersections of low-grade gold-bearing iron formation were encountered.

BHP-Utah Mines Ltd. explored showings of auriferous iron formation by drilling 150 m on the TROY claims and 365 m on the BRAD claims (19).

Echo Bay Mines Ltd. continued exploration on its producing Lupin gold mine property at Contwoyto Lake (e). Echo Bay contracted MPH Consulting Ltd. to complete a 450 line km HL-EM and magnetometer survey to define the iron formation targets. Mapping, sampling, prospecting and 5 000 m of diamond drilling in 60 holes were completed at a cost of \$1 million.

Cominco Ltd. explored the AUR-24 claims (20) for extensions of the Butterfly gold deposit, which is estimated at 100 000 t grading 17 g per t of gold. Seven drill holes totalling 1 200 m were completed. The claims are held under a joint-venture agreement with Cogema Canada Ltd. and Aber Resources Ltd.

On the REN claims (21), Cominco Ltd., the operator, and joint venture partner, Westview Resources Inc. drilled 18 holes totalling 2 396 m, to explore iron formations for gold. Six holes tested the Main zone and its northern strike extension; two holes were drilled on the Banner zone and 10 holes were drilled to test nine EM conductors. A new discovery, the Grizz showing, a silicate and sulphide iron formation target, was exposed across 34 m, channel sampled and tested with three drill holes. Intersections included 0.9 m grading 7.85 g per t of gold. Mapping, sampling, prospecting and 150 line km of HL-EM and magnetometer surveys were completed. Ex-

penditures were estimated at \$750,000. Western Resources announced that previous drilling in the Main zone indicates a potential for a 1.8 to 2.7 million t deposit in the 10 g per t of gold range, within near vertically dipping sedimentary hosted iron formation.

Lac de Gras Area

In the Exter Lake area, Norm's Manufacturing and Geoservices Ltd. was contracted to conduct soil sampling in the southern part of claim block A, B, C and T (22). A ground geophysical survey was to be conducted on the property during the winter of 1990-1991.

Southern Slave Structural Province

Russell Lake - Indin Lake Area

In the Russell Lake supracrustal belt, Aber Resources Ltd. drilled 680 m in four holes to probe gold-bearing iron formation targets on the BUGOW claims (23). To the northeast of the BUGOW claims, Asarco Exploration of Canada Ltd. mapped, sampled and prospected the YELLER claims (23).

Indian Mountain Lake Area

In the Indian Mountain Lake area, exploration was directed to base metal targets. On the AA and CC claims (27), Cominco Ltd. prospected and sampled soils for base metals in anomalous areas defined by a 1964 ground magnetometer and HL-EM geophysical survey.

Ergo Resources Ltd. and Asquith Resources Inc. completed a 3 300 m drill program in February 1990 to test the Indian Mountain Lake BB zone (27) volcanogenic massive sulphide zinc-lead-silver deposit. Drill intersections extended the south limb of the deposit and intersected copper-rich stringer sulphide alteration some 460 km west of the Kennedy Lake copper-zinc-lead-silver deposits. In August 1990, 19 holes totalling approximately 3 700 m were completed. Previously, reserves of the BB zone and Kennedy Lake deposits combined to the 350 m level were estimated at 1.4 million t grading 10 per cent combined zinc and lead, 137 to 171 g per t of silver and 0.7 g per t of gold. New reserves based on the 1990 drill program were being calculated.

Yellowknife Supracrustal Basin

Cameron-Beaulieu Rivers Belt

Exploration in the Cameron-Beaulieu rivers volcanic belt was directed to both polymetallic volcanogenic sulphide targets and gold targets.

Placer Dome Inc. completed mapping, lithogeochemical sampling and magnetometer, VLF-EM and IP geophysical surveys on the KA and PAM claims (28), which were optioned from W. Kizam. Exploration was directed at potential shear-zone hosted gold deposits.

BHP-Utah Mines Ltd. mapped and prospected on its TOP claim (28).

Noranda Exploration Co. Ltd. worked in the area of the Sunrise base-metals project (29) and drilled 5 000 m to test targets located up to 10 km south of the Sunrise property. The Sunrise deposit, owned by the joint venture of Aber Resources Ltd. and Hemisphere Development Corp. hosts 1.87 million t grading 8.9 per cent zinc, 4.22 per cent lead, 405 g per t of silver and 0.96 g per t of gold. In August 1990, Noranda terminated its option on the Sunrise property.

In the Turnback Lake area, Nanisivik Mines Ltd. drilled 3 000 m to explore the KIL, RHY, CJ and JAK claims (30), under an option from Aber Resources Ltd. and Kelmet Resources Ltd. The target was potential polymetallic sulphide deposits. The 20 drill targets tested were defined by airborne and ground EM geophysical anomalies outlined in 1989.

Pamorex Minerals Inc. drilled 14 holes totalling 887 m to explore for gold on the AP and RGE claims (31), which form part of the Myrt Lake property.

Yellowknife Turbidite Basin

Exploration in this basin was for turbidite-hosted auriferous quartz veins, with the exception of the Nicholas Lake property, where gold deposits are hosted in granodiorite.

In the Gordon Lake area, Cameron Mining Ltd. and New Era Developments Ltd. mined a 1 900 t bulk sample from the DAF (MQ) deposit (32) and a 1 000 t bulk sample from the GOO and CATHY claims (32) on Burnt Island. The latter sample was taken from a decline that

was driven to the 155 m level. During the summer of 1990, 2 000 t of the bulk sample stockpile from the GOO and CATHY claim comprising material mined in 1989 and 1990 were hand-picked, and 1 700 t were processed through a 25 tpd mill brought to the site during the winter of 1989-1990. The bulk sample taken from the DAF deposit is to be processed in 1991.

Roxwell Gold Mines Ltd. drilled nine holes to confirm grade and continuity of the main vein of the TRYME claims (32). Acquired from Cominco Ltd., the property has an estimated 87 100 t grading 9.26 g per t of gold.

Athabaska Gold Resources Ltd. and Chevron Minerals Ltd. drilled two deep holes and two shallow holes totalling 1 863 m on the NIC claims (33) (Nicholas Lake property). The two deep holes intersected extensions of the A-7 and A-6 veins, confirming the downward projection of the Main showing. One of the holes intersected 3.9 m grading 5.4 g per t of gold and a second hole intersected 1.1 m grading 76.4 g per t of gold. The Nicholas Lake deposit has reserves, presently outlined by 69 drill intersections, amounting to 557 000 t grading 12.3 g per t of gold.

Treminco Resources Ltd. continued to explore its TOM and PTARMIGAN properties (a,34) by drilling approximately 2 440 m. Ore intersections on the C vein will be explored from underground by drifting from the Tom mine.

Yellowknife Volcanic Belt

Exploration in the Yellowknife volcanic belt was directed entirely at gold targets.

In December 1989, Can-Mac Exploration Ltd. completed mining a 2 300 t bulk sample, estimated to grade 18.4 g per t of gold, from the MON property (35). The bulk sample was shipped to the Ptarmigan mill for processing. Three holes totalling 100 m were also drilled from underground.

In the Walsh Lake area, W. Humphries prospected and mapped the SAM and EAGLE claims (36).

Kelmet Resources Ltd. continued exploration on the volcanic-sediment contact on the TING, WAL, EQUINOX, KELLY, DUCK, TORO and CADEN claims (36) by prospecting and sampling.

Nathan Minerals Inc. explored the volcanic-sediment contact on the PRO and ANN claims (36) by drilling seven holes.

Giant Yellowknife Mines Ltd. completed four deep exploration holes from surface on its GIANT mine property (a, 37). Although the shear zone targets were intersected, gold values were low.

NERCO Inc. aggressively explored its NERCO Con mine leases (a, 37). Surface work included extensive mapping and geochemical sampling and drilling 3 500 m at Rat Lake and 2 000 m at Crank Lake to test the Con shear. Following an extensive IP survey south of the Robertson shaft, 600 m were drilled at Negus Point to test the Campbell shear and 1 000 m were drilled at Fault Lake to test the extension of the Campbell shear. The C16 and C20 shears were explored by trenching and channel sampling, mapping and both magnetometer and VLF-EM geophysical surveys. Exploration expenditures were estimated at over \$800 000. The underground exploration program is also described in this report under the caption "NERCO Con Mine Ltd., Con-Mine".

Golden Marlin Resources and joint-venture partner Cameco conducted an IP survey and drilled 11 holes totalling 1 300 m to explore for shear-hosted gold deposits on the MARLIN claims (37) covering Yellowknife Bay, Great Slave Lake. The best drill intersection returned a range of conflicting assay values over a width of one m.

Bear Structural Province

Cominco Ltd. prospected and mapped parts of Prospecting Permits 1244 to 1250 in the Bear Province, near the boundary of the Slave Structural Province.

Great Slave Plain and Cordillera

The Great Slave Plain is that part of the Interior Plain, which lies between latitudes 60° and 64° north and between the Franklin Mountains and the western edge of the Precambrian shield. It is underlain mainly by Paleozoic sedimentary rocks. The Horn Plateau consists of Mesozoic strata.

BP Canada Ltd. drilled several holes near the Horn Plateau (39) in the Great Slave Plain area, west of

Yellowknife. The company also explored prospecting permits in the Greasy Lake area (38).

Cominco Ltd. conducted geophysical surveys on claims near Raccoon Lake (39) and Mink Lake (40) and Chedabucto Lake (41).

In the Cordillera, Procan Exploration Co. Ltd. conducted geochemical sampling on the RICO and PC claims (42) for polymetallic base-metals deposits.

Southeast MacKenzie District

East of Great Slave Lake, in the Taltson Arc, Kelmet-Resources Ltd. and Prairie Cache Resources Ltd. prospected on the EIGHT, ONE THREE MINE and PROSPERITY claims (43), in the Thubun Lakes area. The companies also mapped copper-zinc-silver-gold showings.

BHP-Utah Mines Ltd. mapped and sampled copper-nickel-gold-platinum group element showings on the LEA claims (44), Rutledge Lake area, that were optioned from Enxco International Ltd.

District of Keewatin

Exploration in Keewatin was directed to gold and base metals in the Rankin-Ennadai volcanic belt and to uranium and gold in the Baker Lake area.

Asamera Minerals Inc., in a joint venture with Comaplex Resources International Ltd., carried out detailed mapping, channel sampling and VLF-EM surveys on the NAT claims (45), located northeast of Rankin Inlet in the Meliadine River area. An east-west striking mineralized zone, 230 m long and open at both ends, was channel sampled. The best sample yielded 20.6 g per t of gold over 8.2 m. Fourteen holes, totalling 1 100 m were drilled in altered iron formation and mineralization was encountered in 11 holes. The best intersection was 12.4 g per t of gold over 12.1 m.

BHP-Utah Mines Ltd. completed 3 050 m of drilling on its Carr Lake claims (46) and on ground east of Maguse Lake (47).

Comaplex Resources International Ltd. prospected, mapped and sampled for gold on Prospecting Permits 1 233 to 1 237 and 1 251 in the Cullaton Lake area (48).

Comaplex Resources International, on behalf of Lucky Eagle Mines, Hecla Mining Company of Canada Ltd. and Agnico Eagle Mines Ltd., worked property held by Comaplex Resources International and Asamera Minerals Inc. The work consisted of VLF-EM and magnetometer surveys, geological mapping and 2 600 m of drilling in 27 holes on the Meadowbank River claims (49) and prospecting on nearby Prospecting Permits 1206 to 1209. The principal target was gold associated with sulphide-bearing iron formation and associated shears.

INCO Exploration and Technical Services Inc. conducted regional geological mapping, HL-EM, IP and magnetometer surveys on the IGLOO claims (50), in the Dawson Inlet area.

On behalf of Lucky Eagle Mines, a joint venture of Agnico Eagle Ltd. and Hecla Mining Company of Canada Ltd., W.A. Hubacheck Consultants Ltd. conducted EM, VLF-EM and magnetometer surveys on gold and possible base metals targets on Prospecting Permits 1170 and 1171 in the Kasba Lake — Ennadai Lake area (51).

Norstrad Exploration Inc. and Acadia Mineral Ventures Ltd. prospected and sampled the newly staked KING claims (52) in the Padlei area.

Suncor Inc. prospected and mapped Prospecting Permits 1229 to 1232 (48).

West of Baker Lake, Urangesellschaft (Canada) Ltd. in joint venture with PNC Exploration (Canada) Ltd. drilled a total of 6 700 m on a lease and claim block in the Judge Sissons Lake — Schultz Lake area (53) and carried out a prospecting program on adjacent Prospecting Permits 1161 to 1163. Surface VLF-EM, magnetometer, resistivity and gravity geophysical surveys were performed in selected areas.

Arctic Islands

Nanisivik Mines Ltd. explored the Nanisivik mine area (c) with a drill program and VLF-EM surveys.

In the central Arctic, Cominco Ltd. conducted UT-EM surveys and several thousand metres of drilling on the Truro Island and Eclipse zinc-lead deposits (55), on northeastern Cornwallis Island. Cominco Ltd. also staked claims on northern Cornwallis Island (56).

Noranda Mines Ltd. staked a large number of claims on north-central Victoria Island (57) to cover widespread copper occurrences in red-bed type showings. The occurrences were found in flat-lying Proterozoic quartzite.

Aber Resources Ltd. and Nanisivik Mines Ltd. plan to conduct an exploration program in the area during 1991 under terms of a joint venture agreement with Noranda. The 1991 program will include an airborne geophysical survey, a ground geophysical follow-up and drilling.

Table 8:
Placer Mining, Mines and Mining Exploration Properties, Yukon Territory, 1990

Location	N.T.S.	Property/CLAIM(S)	Company/Area
1	115 O	Indian River	Placer mining area
2	115N, O	Klondike	Placer mining area
	116 B, C	Klondike	Placer mining area
3	116 B, C	Sixty Mile, Forty Mile Rivers	Placer mining area
4	115 N, O	Lower Stewart River	Placer mining area
5	105 M	Mayo	Placer mining area
6	115 P	Clear Creek	Placer mining area
7	115 I	Dawson Range	Placer mining area
8	105 E	Livingston Creek	Placer mining area
9	105 A	MT. HUNDERE	Curragh Resources Inc., Hillsborough Resources Inc.
10	105 M	United Keno Hill	Bharti Laamanen Mining Company Ltd.
11	105 O	TOM	Cominco Ltd., Hudson Bay Exploration and Development
12	105 O	NIDD	Cominco Ltd.
13	105 O	JASON	Phelps Dodge Corporation of Canada
14	106 D	MARG	NDU Resources Inc., Cameco
15	106 D	BLENDE	Billiton Metals Canada Inc., NDU Resources Inc.
16	95 D	MEL	Barytex Resources Corp.
17	105 B	DAN	First Yukon Silver Resources
18	116 C	MICKEY	Archer Cathro & Associates (1981) Ltd.
19	105 L	DROMEDARY MT.	Dromedary Exploration Co. Ltd.
20	105 F	KETZA	Yukon Minerals Corporation
21	115 I	WILLIAMS CREEK	Thermal Exploration, Teck Corporation
22	105 D	GRAFTER	Aurora Gold
23	105 G	FYRE LAKE	Placer Dome Inc.
24	116 B	BREWERY CREEK	Loki Gold Corporation, Noranda Exploration Company Ltd.
25	115 O	LONESTAR	Arbor Resources Inc.
26	105 D	GODDELL	Skukum Gold Inc., Berglynn Resources Inc.
27	115 I	CARIBOU CREEK	Doron Explorations Inc.
28	115 I	GOULTER	Aurchem Exploration
29	105 C	TOG	Dunvegan Exploration Ltd.
30	105 D	PEERLESS	Feather Gold Resources Ltd.
31	105 O	ITSI, PUTZ-BENNETT	Noranda Exploration Company Ltd.
32	95 D	HYLAND GOLD	NDU Resources Inc. et al
33	115 N	CONNAUGHT	Tombstone Explorations Ltd.
a	105 F	Ketza River Mine	Camamax Resources Corp.
b	105 K	Faro and Vangorda Mines	Curragh Resources Inc.
c	105 M	KENO, LUCKY QUEEN	Archer, Cathro & Associates (1981) Ltd.
d	105 H	KING ARCTIC	Max Rosequist

Table 9:
Mines and Mining Exploration Properties, Northwest Territories, 1990

Location	N.T.S.	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company
1	77 A	CAPE, DOK, LARK	Noranda Exploration Company Ltd.
2	76O	KAMIK	BHP-Utah Mines Ltd.
3	76 M	TAM, TELLY, JOY, ANIALIK	Continental Pacific Resources Ltd.
4	76 M	CHAR	Continental Pacific Resources Ltd.
5	76 M	PP. 1181, ARNICA	BHP-Utah Mines Ltd.
6	76L	ULU, PULSE, DEN, FIDO	BHP-Utah Mines Ltd.
7	76 M	BAMAKO, PARIS	BHP-Utah Mines Ltd.
8	76 L	HOTEI	BHP-Utah Mines Ltd.
9	76 M	ROMA	BHP-Utah Mines Ltd.
9	76 M	HIGH LAKE	Kennco Explorations (Canada) Ltd.
9	76 M	MONA, CHARLIE	Continental Pacific Resources Ltd.
9	76 M	KLC	Cominco Ltd.
10	76 M	CYGNET	BHP-Utah Mines Ltd.
11	76 G	BRAU	George Lake Joint Venture
11	76 G	RAP, WR, IPG, SEL, LOW	Echo Bay Mines Ltd.
12	76 G	BRAU	Back River Joint Venture
13	76 G	BRAU	Back River Joint Venture
14	76 G	RAJAH, PRIMERO	BHP-Utah Mines Ltd.
15	76 G	GAET	Cogema Canada Ltd.
16	76 F	MUSKOX, WASP, UP	Equity Silver Mines Ltd.
17	86 I	HOOD	Falconbridge Limited
18	76 E	COCO	Cominco Ltd., Cogema Canada Ltd.
19	76 E	TROY, BRAD	BHP-Utah Mines Ltd.
20	76 E	AUR 24	Cominco Ltd.
21	86 H	REN	Cominco Ltd., Westview Resources Inc.
22	76 D	A, B, C, T	Norm's Manufacturing and Geoservices Ltd.
23	85 O	BUGOW	Aber Resources Ltd.
23	85 D	YELLER	Fortune Minerals Limited, Asarco Exploration of Canada Ltd.
24	86 B	MESA	Noranda Exploration Co. Ltd.
25	86 B	KIM	Echo Bay Mines Ltd.
25	86 B	NAM 3	Stratabound Minerals Corp.
26	86 B	BAJ, ED, CDC	Northwest Gold Corp.
27	76 M	AA, CC	Cominco Ltd.
27	76 M	BB	Ergo Resources Ltd., Asquith Resources Inc.
28	85 P	KA, PAM	Placer Dome Inc.
28	85 P	TOP	BHP-Utah Mines Ltd.
29	85 I	SUNRISE	Noranda Exploration Co. Ltd.
30	85 I	KIL, RHY, CJ, JAK	Nanisivik Mines Ltd.
31	85 I	AP, RGE	Pamorex Minerals Inc.
32	85 I, P	DAF, GOO, CATHY	Cameron Mining Ltd., New Era Development Ltd.
32	85 P	TRY ME	Roxwell Gold Mines Ltd., Chevron Minerals Ltd.
33	85 P	NIC	Athabaska Gold Resources Ltd., Chevron Minerals Ltd.

Table 9: (Continued)
Mines and Mining Exploration Properties, Northwest Territories, 1990

Location	N.T.S.	CLAIM(S)/Prospecting Permits (P.P.)/Area	Company
34	85 J	TOM, PTARMIGAN (Mine)	Tremenco Resources Ltd.
35	85 J	MON	Can-Mac Exploration Ltd.
36	85 J	TING, WAL, EQUINOX, KELLY, DUCK, TORO, CADEN	Kelmet Resources Ltd.
36	85 J	PRO, ANN	Nathan Minerals Inc.
37	85 J	GIANT (mine)	Giant Yellowknife Mines Ltd.
37	85 J	CON (mine)	NERCO Con Mine Ltd.
37	85 J	MARLIN	Golden Marlin Resources Ltd.
38	95 J	Greasy Lake Area	BP Canada Ltd.
39	85 K, L	Horn Plateau Area	BP Canada Ltd.
39	85 K	Racoon Lake Area	Cominco Ltd.
40	85 F	Mink Lake Area	Cominco Ltd.
41	85 J	Chedabucto Lake Area	Cominco Ltd.
42	95 F	RICO, PC	Procan Exploration Co. Ltd.
43	75 E	EIGHT, ONE THREE MINE	Kelmet Resources Ltd., Prairie Cache Resources Ltd.
44	75 E	LEA	BHP-Utah Mines Ltd.
45	55 J, K,	NAT	Asamera Minerals Inc., Comaplex Resources
		N,O	International Ltd.
46	55 L	Carr Lake Area	BHP-Utah Mines Ltd.
47	55 E	Maguse Lake Area	BHP-Utah Mines Ltd.
48	65 G, H	P.P. 1233-1237, 1251	Comaplex Resources International Ltd.
48	65 G	P.P. 1229-1232	Suncor Inc.
49	66 H	Meadowbank R. Area	Comaplex Resources International Ltd.
50	55 F	IGLOO	INCO Exploration and Technical Services Inc.
51	65 C	WADE, P.P. 1170, 1171	Lucky Eagle Mines
52	65 H	KING	Norstrad Exploration Inc., Acadia Mineral Ventures Ltd.
53	66 A, B	P.P. 1161-1163	Urangesellschaft (Canada) Ltd., PNC Exploration (Canada) Co. Ltd.
54	66 A	Kiggavik property	Urangesellschaft (Canada) Ltd., CEGB Exploration (Canada) Ltd.
55	68 H	Northeast Little Cornwallis Island	Cominco Ltd.
56	58 G	Northern Cornwallis Island	Cominco Ltd.
57	78 B	North-Central Victoria Island	Noranda Mines Ltd.
a	85 J	Giant Mine	Giant Yellowknife Mines Ltd.
a	85 J	Con Mine	NERCO Con Mine Ltd.
a	85 J	Ptarmigan and Tom Mines	Tremenco Resources Ltd.
b	68 H	Polaris Mine	Cominco Ltd.
c	48 C	Nanisivik Mine	Nanisivik Mines Ltd.
d	86 B	Colomac Mine	Northwest Gold Corp.
e	76 E	Lupin Mine	Echo Bay Mines Ltd.
f	85 B	Pine Point Mine	Cominco Ltd.

GLOSSARY OF TERMS

ECONOMIC/FINANCIAL TERMS

Abandonment Security: A security provided by a mining company to the responsible level of government. In the event of an unplanned closure there would be funds available to restore the site in an environmentally sound manner.

Cash Flow: The difference between an operation or company's cash inflows and cash outflows for a specified time period. Specifically, income less expenditures plus depreciation and deferred income tax.

Constant Money Value: Constant money units have a constant purchasing power, measured by the goods and services they will buy and are defined with respect to the purchasing power of a currency at a particular point in time, normally the present.

Current Money Value: Current money units reflect the money value existing at a particular point in time based on its actual or estimated purchasing power.

Depreciation Allowance: A tax deduction allowed to a company to deduct or to write off the capital costs of its fixed asset.

Mineral Economics: Is the application economics to the study of all aspects of the mineral sector.

Net Present Value: The present value of the sum of all anticipated future positive cash flows from a project that have been discounted using the cost of capital as the discount rate.

Operating Costs: There are many measures of operating costs including, cash costs, cash plus capital costs and cash, capital, and interest costs. It is important to always determine which costs are being included in the operating costs under discussion.

Payback Period: The number of years required to recover an investment from the positive cash flows of an operation measured from the start of production.

Rate of Inflation: The relationship between constant and current money which measures the rate at which the purchasing power of a currency decreases with time.

Rate of Return: This is a measure of the average annual percentage return on investment that an operation is expected to yield over the total project life. The rate of return must be greater than the cost of capital in order to avoid economic loss.

Sunk Cost: These are the costs that have already been incurred by a project. A sunk cost cannot be altered and therefore is irrelevant for decision-making purposes.

Working Capital: This refers to the funds available to a company for carrying on the activities of business after an allowance for bills that have to be paid within the year.

GEOPHYSICAL TERMS

Conductive Anomaly: A ground area which exhibits higher than average conductance and may indicate the presence of a metallic mineral deposit or other conductive minerals such as graphite.

Geochemical Anomaly: An area where higher than expected levels of metals are indicated as the result of chemical analysis from soil or rock samples.

HL-EM Survey: A Horizontal Loop Electromagnetic Survey uses two loops, one a transmitter and the other a receiver, at a fixed distance apart. A primary field is generated and distortion by the induced electro-magnetic field is measured to determine the presence of mineralization.

IP Survey: An Induced polarization survey, either electrical or magnetic, involves the application of an electrical or magnetic field to the earth's surface then the decay characteristics of the induced field are measured and interpreted to determine the presence of a mineralized deposit.

Lithogeochemical Sample: Refers to any sample of the lithosphere (rocks, soils and sediments). Generally such samples are collected and analyzed as part of a mineral exploration program.

Magnetometer Survey: A survey to measure the minute changes in the earth's magnetic field. The results of the survey can show areas of potential mineralization that could be further explored by diamond drilling.

Resistivity Survey: A survey to measure the electrical resistance characteristics of the earth's crust to an applied electrical current over a given area. Mineralized areas can be identified for further exploration.

VLF-EM Survey: A Very Low Frequency Electromagnetic survey uses a 10kHz to 30 kHz electromagnetic signal with wavelengths of 10 to 30 km as its primary field. An EM survey will give some indication of the depth of a conductive body below surface.

OPERATIONAL TERMS:

Drift: A horizontal passage or working area underground. A drift is commonly driven to follow the mineralization being mined.

Mineral Claim: A area of land, often rectangular in shape, with identified boundaries. Mineral claims once staked are registered with a government authority. Requirements to maintain ownership are determined by the provincial or federal government.

Mineral Reserves: A quantitative measurement of minerals in place, usually reported in tonnes of metal content. There are many different types of mineral reserves such as probable, possible and inferred depending on the level of known information. It is most important to define what kind of reserves have been identified.

Placer Mining: The extraction of heavy metals such as gold from unconsolidated sands and gravels using flowing water and mechanical equipment such as sluice boxes or dredges. Placer operations range from single miners panning on a river bank to large operations with many miners and sophisticated equipment.

Ramp: An inclined access way for the movement of miners, equipment and materials into and out of an underground mine. The portal is the opening where the ramp meets the surface. Internal ramps connect one or more working levels within a mine.

Tailing Retreatment: Earlier metallurgical processes often left appreciable amounts of unrecovered metals or minerals in the tailings. Technological advances have allowed for these tailing to be retreated and economic amounts of metals and minerals to be recovered.

Water Licence: A permit that is issued to an individual or business whose activity may have some impact on the quality and quantity of water in the operating area. Such licences are issued by the Water Boards operating under the Northern Inland Waters Act in the northern territories.

MINERALOGICAL and PETROLOGICAL TERMS:

Azurite: Copper Carbonate $\text{Cu}_2(\text{CO}_3)_2(\text{OH})_2$. Like malachite it is a secondary copper mineral found in the oxidized zone of copper deposits. It is a distinct blue colour.

Barite: Barium Sulphate BaSO_4 . It often occurs as a vein filling or a gangue material with base-metal ores. It is the principal source of barium. Barite is often used in drilling mud and as a filler for paper and textiles.

Chalcopyrite: Copper-Iron Sulphide $(\text{CuFe})\text{S}_2$. The most important ore mineral of copper, often found in hydrothermal veins associated with galena and sphalerite. Chalcopyrite is also called "fool's gold" because of its golden colour.

Dolomite: Calcium-Magnesium Carbonate $\text{CaMg}(\text{CO}_3)_2$. Dolomite occurs widely as a rock forming mineral. It occurs as a gangue mineral in hydrothermal veins particularly those with galena and sphalerite. The mineral dolomite is often used in the manufacture of refractory bricks.

Galena: Lead Sulphide PbS . A common ore mineral of lead, typically found in medium-temperature hydrothermal deposits.

Granodiorite: A coarse-grained igneous rock composed mainly of quartz, potassium feldspar and plagioclase. It is the most common rock of the granite family.

Limonite: Hydrated Iron Oxide $\text{FeO}(\text{OH})$. Limonite is produced by the oxidation of iron sulphide minerals. It is very soft and is used as a yellow pigment.

Malachite: Copper Carbonate $\text{Cu}_2\text{CO}_3(\text{OH})_2$. A secondary copper mineral commonly found in the oxidized zone of copper deposits. It is a distinct green colour.

Nephrite: Calcium-Magnesium Silicate $\text{Ca}_2(\text{Mg,Fe})_5\text{Si}_8\text{O}_{22}(\text{OH})_2$. Nephrite is one of two minerals referred to as jade, it is very tough and is often used in carvings and jewellery.

Placer Gold: An impure form of metallic gold recovered from gold bearing sands and gravels. Often, placer gold is only 80 per cent pure, the remainder is often silver or copper.

Phyllite: A rock produced by low-grade metamorphism of shale or slate. It is usually grey or green in colour with a characteristic silvery sheen.

Pyrrhotite: Iron Sulphide FeS . A variation of pyrite in which some of the iron has been replaced by other metals. It is sometimes magnetic and can be an important source of nickel when it is the replacement metal.

Quartzite: A rock produced from metamorphosed quartz sandstones. It is usually medium grained and light-coloured white grey or reddish.

Quartz Monzonite: An igneous rock containing equal amounts of plagioclase and alkali feldspar.

Pyrite: Iron Sulphide FeS_2 . One of the most common and widely distributed sulphide minerals. It occurs in many different geological environments.

Sphalerite: Zinc-Iron Sulphide $(\text{Zn,Fe})\text{S}$. The main ore mineral of zinc, found in hydrothermal veins often associated with galena.

Tetrahedrite: Copper-Iron-Antimony-Arsenic Sulphide $(\text{Cu,Fe})_{12}(\text{Sb,As})_4\text{S}_{12}$. Tetrahedrite is often found in hydrothermal veins associated with silver, copper, lead and zinc minerals.

GEOLOGICAL TERMS

Cretaceous Period: The interval of geologic time which began about 136 million years before the present and lasted about 71 million years.

Dike: A tabular body of of intrusive igneous rock which cuts across the layering or structural fabric of the host rock. Dikes can vary both in thickness and in length from less than a metre to over a kilometre.

Dip: The angle in degrees between the horizontal and the inclined plane of a vein or rock strata measured perpendicular to the horizontal direction of the plane.

Fault Zone: A fault evidenced by a zone consisting of a network of many small faults forming a strip that can sometimes be several hundred meters wide.

Intrusion: A forceful injection of molten rock into a pre-existing rock. The intrusion can cut across the pre-existing structure or follow along some structural channel such as a bedding plane.

Mesozoic Era: This era follows the Paleozoic and lasted 155 million years from 220 to 65 million years before the present.

Paleozoic Era: This era lasted the 350 million years immediately following the Precambrian era which accounts for the first 3.9 billion years of time.

Proterozoic Period: This includes the later part of the Precambrian Era.

Shear Zone: An area where the rock has been crushed into small pieces due to the cumulative small lateral movements along many parallel planes.

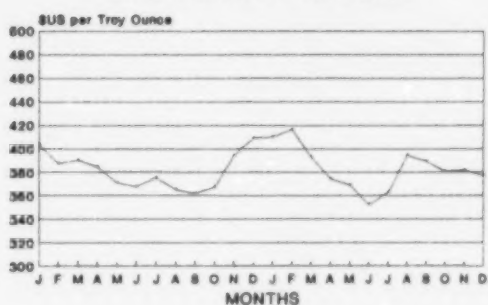
Strike: The trace of a dipping plane such as a fault, a bedded rock or a vein as it intersects the horizontal plane.

Vein: A tabular or sheetlike body of one or more minerals deposited in open fissures, joints or faults.

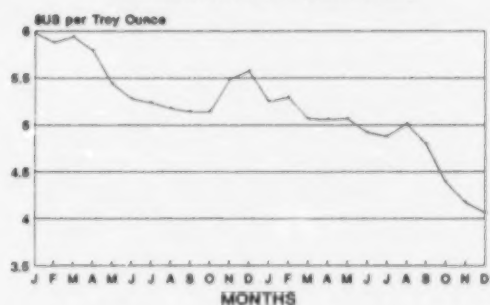
Figure 1.

LONDON METAL EXCHANGE PRICES

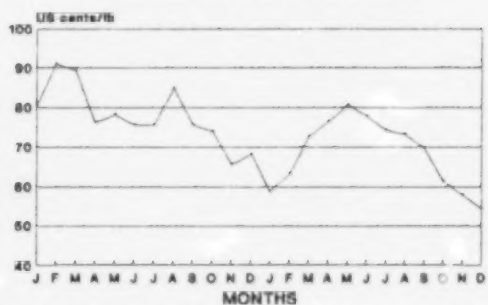
GOLD PRICES 1989-90
LME MONTHLY AVERAGE



SILVER PRICES 1989-90
LME MONTHLY AVERAGES



ZINC PRICES 1989-90
LME MONTHLY AVERAGES



LEAD PRICES 1989-90
LME MONTHLY AVERAGES

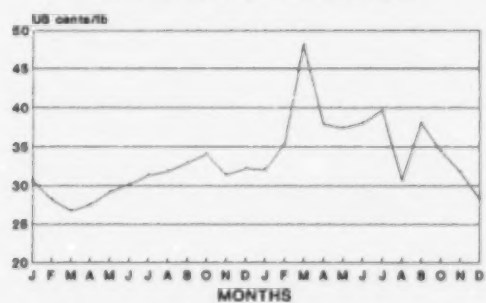


**TABLE 10:
Mineral Production, Yukon,
1981-1990**

Mineral	1981	1982	1983	1984	1985	1986	1987	1988	1989(R)	1990(P)
Gold	% 66 382 000 3 746	39 721 000 2 656	50 337 000 3 006	44 419 000 2 960	42 669 000 3 065	58 237 000 3 547	88 970 000 4 674	87 386 000 5 052	80 070 000 5 652	66 342 000 4 602
Silver	\$ kg 32 339 000 80 000	29 943 000 95 000	6 891 000 15 000	18 825 000 54 000	13 098 000 47 000	18 468 000 73 000	40 965 000 133 000	42 593 000 159 000	14 851 000 71 000	15 427 000 84 000
Lead	\$ kg 54 935 000 55 970 000	25 733 000 35 493 000	307 000 520 000	1 539 000 2 083 000	848 000 1 470 000	23 893 000 35 091 000	105 982 000 100 267 000	118 696 000 117 058 000	98 310 000 94 529 000	127 458 000 106 489 000
Copper	\$ kg 20 123 000 9 094 000	14 654 000 7 510 000	3 977 000 1 904 000		19 000 10 000	13 000 6 000	22 000 9 000			
Zinc	\$ kg 94 237 000 78 806 000	58 519 000 54 537 000	31 000 27 000	244 000 173 000	137 000 109 000	61 521 000 50 634 000	187 336 000 147 045 000	237 932 000 143 939 000	332 934 000 154 709 000	327 836 000 170 128 000
Antimony	\$ kg				11 000 1 000	5 000 541	2 000	2 000	11 000 4 000	5 000 2 000
Bismuth	\$ kg			2 000 162						
Cadmium	\$ kg		6 000 2 000	9 000 2 000	5 000 1 000	8 000 2 000	13 000 2 000	62 000 3 000	8 000 1 000	
Sand and Gravel	\$ t	550 000 463 000	1 438 000 480 000	5 105 000 3 074 000	2 995 000 1 185 000	13 355 000 4 902 000	1 502 000 352 000	5 184 000 2 246 000	5 675 000 2 367 000	4 015 000 1 763 000
Sulphur (smelter gas)	\$ t				267 000 2 000	1 000 7	156 000 1 000	183 000 2 000	39 000 N/A	28 000 N/A
Coal (E)	\$ t	368 000 20 860				209 000 17 223	440 000 20 000	100 000 10 000	420 000 40 000	
Stone	\$ t						679 000 206 000			
TOTAL	\$	268 016 000	169 120 000	70 143 000	60 069 000	176 310 000	426 027 000	492 299 000	532 330 000	541 134 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.
(P) Preliminary figures, (R) Revised figures, (E) Estimated, (X) Confidential, (N/A) Not available

TABLE 11:
Mineral Production, Northwest Territories,
1981-1990

Mineral	1981	1982	1983	1984	1985	1986	1987	1988	1989(R)	1990(P)	
Gold	\$ kg	85 495 000 4 825	91 415 000 6 113	144 570 000 8 634	191 071 000 12 732	177 079 000 12 713	205 266 000 12 503	223 456 000 11 740	205 503 000 11 880	177 260 000 12 208	217 131 000 15 063
Silver	\$ kg	13 456 000 33 000	16 073 000 51 000	33 743 000 74 000	20 361 000 53 000	9 083 000 33 000	5 478 000 22 000	4 006 000 13 000	6 923 000 26 000	3 820 000 18 000	5 344 000 29 000
Copper	\$ kg	613 000 277 000	419 000 215 000	214 000 102 000	130 000 69 000	46 000 23 000	1 000 1 000	4 000 2 000	3 000 1 000		
Lead	\$ kg	44 680 000 45 522 000	46 367 000 63 955 000	47 981 000 81 161 000	66 647 000 90 198 000	44 489 000 77 083 000	91 129 000 133 836 000	139 370 000 131 744 000	52 223 000 51 502 000	41 323 000 39 734 000	45 595 000 38 091 000
Zinc	\$ kg	159 764 000 133 604 000	229 110 000 213 523 000	269 951 000 234 883 000	386 813 000 274 920 000	356 415 000 284 223 000	322 064 000 265 073 000	328 781 000 258 070 000	537 756 000 325 321 000	708 009 000 329 001 000	611 434 000 312 298 000
Cadmium	\$ kg		10 000 3 000		1 034 000 214 000	866 000 238 000	670 000 175 000	501 000 86 000	3 172 000 166 000	4 405 000 289 000	2 392 000 273 000
Bismuth	\$ kg		163 000 32 000		34 000 3 000	60 000 3 000					
Antimony	\$ kg						141 000 44 000	55 000 19 000	43 000 18 000		18 000 9 000
Tungsten Trioxide (E)	\$ kg	43 363 000 2 515 000	38 353 000 2 925 000	11 221 000 1 126 000	33 584 000 3 112 000	38 918 000 3 529 000	17 363 000 2 470 000				
Arsenious Trioxide (E)	\$ t	561 000 1 094	3 862 000 1 780	2 345 000 982	5 837 000 4 684	1 969 000 4 098	254 000 406	666 000 X	2 366 000 X	1 286 000 X	288 000 X
Sulphur (smelter gas)	\$ t				98 000	11 665 000 147 000	21 788 000 59 000	6 912 000 6 000	7 286 000 73 000	8 468 000 67 000	6 053 000 47 000
Sand and Gravel	\$ t		41 482 000 6 625 000	32 479 000 5 905 000	36 323 000 7 249 000	8 981 000 6 803 000	3 281 000 986 000	8 132 000 2 183 000	10 966 000 2 443 000	11 813 000 2 203 000	11 609 000 2 164 000
Stone	\$ t		1 268 000 323 000	14 601 000 2 409 000	4 617 000 729 000	434 000 163 000	1 011 000 368 000	1 486 000 472 000	232 000 108 000	4 344 000 727 000	6 550 000 1 022 000
TOTAL	\$	347 841 000	468 349 000	557 198 000	746 451 000	649 732 000	668 452 000	713 310 000	826 487 000	960 771 000	906 414 000

Source: Mineral Policy Sector, Energy, Mines and Resources Canada and Natural Resources and Economic Development, Indian Affairs and Northern Development.
(P) Preliminary figures, (R) Revised figures, (E) Estimated, (X) Confidential